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## BRIEFLY TOLD.

THE RUSSELL AND WEBER PAPERS.—The matter of retorts and their proper firing came in for much attention at the last meeting of the Pacific Coast Gas Association, as our report of the proceedings of that most enjoyable convention amply attests. It is a long hark from St. Louis to San Francisco, and a yet greater one from New York to the most important city of the Coast; still it is so that both St. Louis and New York contributed to the meeting's paper list, and added thereby to the attractiveness of the sessions. St. Louis was represented by Mr. Daniel R. Russell, who selected as his theme "Recuperator Benches for Coke and Coal Firing." The lines of his paper, with the resultant discussion, were given in our issue for last week, and we are certain that the paper and the debate have come in for much attention. The genial author, whose personal cleverness and wholesome methods have made for and kept to him a legion of friends the country over, needs no introduction at our hands to the fraternity; but we believe not everyone was prepared to admit that he was entitled to a high place in the ranks as a paper producer. His chapters before the Coast Association, however, have such cogency, evidence such careful preparation, and have so much all-round merit, that his fame as an author is assured. It is difficult to separate shop from work, but Mr. Russell, in his Coast paper, although writing on a topic that must of necessity have kept his own personal business constantly before him, never let in a word which could cause the casual reader, or, for that matter, the close student, to suppose that its author was identified with a busy, bustling fireclay works. He studied his subject from a practical standpoint, presented it from a general and independent view, and summed it up in a way that was nothing if not impartial. Such papers are of great value, no matter how many or few are appealed to by their lines; for those who read them are convinced that it was not self-interest that prompted their preparation.

The paper by Mr. Oscar Weber, of New York, on "Clay Retorts," the text of which will be found in our current issue, affords another instance of how shop and the expression thereof can be kept apart, even in a paper descriptive of that with which the author has been concerned for a lifetime. Mr. Weber's paper, although largely historical, in which respect it is quite accurate, is well worth reading, for in it he raises a question that should have been given a far greater measure of attention than heretofore accorded it. That question is, "What is the permeability of retort walls?" A rough-and-ready answer would be that such permeability depended largely on the nature of the composition and manipulation of the materials that entered into the retort structure as completed by the manufacturers; but that answer would not wholly be sufficient, since the best retort that ever was made could in short order be put on a parity with the worst one ever made, through imperfect initial heating. All things considered, not the least interesting portions of the proceedings of the last Coast meeting are those connected with the Russell and Weber papers.

NOTES.—That electric lighting or other competition in the artificial lighting field does not seem to affect the gas business untowardly, in England any more than in America, is shown by the reports of the two large gas companies of London. The returns from The Gas Light and

Coke Company and the South Metropolitan Company, of London, for the half year ended June 30th last, prove most conclusively that gas is more than ever favored by the masses. For the period named the South Metropolitan Company reports a gain in gas sold of 10 per cent. over the corresponding half of 1896; the gain in the case of The Gas Light and Coke Company amounting to 7 per cent.——The syndicate that has been bartering for control in the New Haven (Conn.) Gas Light Company has secured an extension of its option to October 1st.——The proprietors of the Tyrone (Pa.) Gas and Water Company have informed the local authorities that the lowest sum they will take for their plants—the authorities have been endeavoring to secure these properties for operation on municipal account—is $250,000.——The old gasholder of the Boston Gas Light Company, which for many years was a landmark on Federal street near the bridge, has been dismantled. It stood on land that had been condemned for the use of the South Terminal Company.——The offices of the board of gas fixture inspectors, for such we must call them until apprised of their actual legal title, for the city of Boston, are to be located in the Court House. The board, which was created under authorization of the last Massachusetts Legislature, is to assume its duties October 1st.——The Lowe family has filed articles incorporating the American Gas and Coke Company, with a capital of $1,000,000. The principal places of business named in the papers are Phœnix, Ariz., and Los Angeles, Cal., and the stated objects are the manufacturing of gas and coke and the controlling of pipe lines, etc.——The proprietors of the Pittsfield (Mass.) Company are placing 10 inch mains, through certain parts of Appleton avenue and East street, for the purpose of improving the distribution conditions.——The gas franchise for Dover, N. J., has finally and legally been vested by the authorities in the Dover Electric Light Company.

## Deceptive Methods of Patent Attorneys.

The *Scientific American*, in editorial comment on this subject, says: The general discredit which the practice of certain patent attorneys has cast upon the Patent Office and the profession, by reason of their peculiar crooked methods and deceptive advertisements, is greatly to be deplored, since it is likely to create in the minds of many well meaning inventors a lack of confidence in all attorneys, however honorable a reputation they have borne in the past. The activity, however, of the present Commissioner of Patents, the Hon. Benjamin Butterworth, in taking measures to raise the standard and morale of the office, and by examining into the methods of John Wedderburn & Company, charged with pursuing fraudulent methods in patent practice, is greatly to be commended and will doubtless receive the approval of all inventors.

We believe there has never been before the Patent Office a case of such magnitude as that now pending before the Commissioner, in which is disclosed by the evidence, a surprising system of misrepresentation and equivocation designed for the deception of inventors.

According to the evidence as brought out at the examination by Assistant Commissioner Greeley, who has been assigned by the Commissioner to conduct this investigation, it appears in a large percentage of cases it was the custom of the firm in question to render favorable reports and send misleading letters to inventors of clearly unpatentable inventions. When the inventor responded and the application was lodged in the Patent Office, he was usually rewarded with a silver medal. Upon the absolute refusal by the Patent Office of a patent the inventor was advised that serious objections were raised against the granting of a patent, which might be overcome if an appeal was taken to the Board of Examiners in Chief, and further fees were asked for. If the amount was forthcoming, in numerous cases very little or no effort was made by argument, and usually the decision of the examiner below was affirmed, of which the inventor was seldom notified, but on the contrary was apprised of the probable remarkable value of the invention, estimated at various sums from $5,000 to $20,000, and was urged to secure foreign patents. He was further requested to remit another sum for the purpose of advertising the invention and having a sketch of himself written and published.

Thus by an extensive system of flattery and misleading correspondence, combined with medals or prizes, the inventor was led into the belief that his unpatentable invention was patentable and likely to bring to him a fortune.

Whatever may be the outcome of the proceedings instituted by the Commissioner of Patents, one excellent result is already manifest in the fact that fraudulent and crooked methods of securing patents have been in a measure checked, and the aspersions cast upon reputable attorneys nullified. There should be brought about soon a wholesome restoration of confidence between inventors, attorneys and the administration of the Patent Office, which should be of lasting benefit to all.

[Official Report.—Revised by the Secretary.—Continued from Page 292.]

## FIFTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

Held at San Francisco, Cal., July 20, 21 and 22, 1897.

### Second Day, Morning Session., July 21.

The President, having called the Association to order, announced that the proceedings would be commenced by the reading of the paper, by Mr. Oscar B. Weber, of New York, on

### CLAY RETORTS.

The author not being present, Mr. E. C. Jones, at the invitation of the President, read Mr. Weber's paper:

In taking up a subject so closely connected with one of the most important commercial undertakings of the day, I ask your pardon for being led, perhaps more by the significance of its relation to this industry than by its own value.

It would seem that clay retorts were introduced as such by Mr. John Grafton, of Edinburgh, Scotland, in the year 1820, who obtained a patent for an improvement in the method of distilling coal in closed vessels. We would think that a change so vital would be easily and speedily effected, but the world was then as it is now. The retort, as made by Grafton, was in sections, was rectangular and was very large. The inability, unfortunately, of Grafton, as I take it, to properly understand the nature of his material and the requirements of the manufacture, led to failure. The cardinal mistake which he must have made, judging from the meager data available, was in the density of his mixture and the weakness of the construction of the retort. The result was disastrous. The retorts, when exposed to atmospheric action, in the drawing and charging of the coal, rapidly went to pieces, and the escaping gas, mingling with the furnace gases, produced an explosive mixture, causing, in total destruction of the bench, a result hardly anticipated by the inventor.

A failure like this naturally created an intense prejudice against the use of clay retorts, and our friend, the enemy, the manufacturer of iron retorts, rejoiced greatly. Undaunted, Grafton tried again and erected some retorts in one of the London gas works, where, through the intrigues of the iron manufacturers, the bench was ruined in short time and had to be torn down and removed.

It took a long time before the feeling engendered by these consecutive failures could be removed. It was not until the year 1832—and this date can only be assumed, for there is nothing, except a record of an application, in the Royal British Patent Office—that Spinner brought out a sectional retort of huge dimensions. I have not been able to obtain a cut of this, but it is safe to assume that the bottom measured 4 feet across, the rise of arch 36 inches, and the length, 7 feet, with 8 inch walls. This retort was put together in sections and met with more success than those manufactured by Grafton. At all events, the attention of the leading gas engineers was directed to this type of retort, and the quality of the mixture admitted.

So the beginning was made; and slowly, very slowly, the substitution for iron was effected. The construction of the retort, however, was, as viewed by modern demand, absolutely faulty. The tremendous arch and floor area, the great cooling off, upon opening for charging and drawing, produced cracks in the several sections, and the escaping gases often contributed an element of danger. Gradually the opinion gained ground that the sectional retort without spacious openings was not practicable, the superiority, however, of clay to iron being manifest.

The credit for shaping the modern retort unquestionably belongs to the firm of Messrs. Joseph Curven & Co., Newcastle-on-Tyne, who put the first retort in one piece on the market. This made it possible to manufacture gas upon an economical basis.

I will not weary you with the details of manufacturing retorts, nor with the varied shapes. It will suffice, with the general scope of this paper, to add that to-day there are but two distinct shapes used, viz.: The **D** shape and the circular.

It is interesting to note how the growing importance of the gas lighting industry has made the improvement of the quality of the retorts obvious. From the old Boston type of retort, 8 feet long, we have come to retorts of 10 feet length, and, from an estimated output of 5,000 cubic feet, to a guaranteed productibility of 12,000 cubic feet per day; more than double. This change has taken place in the last 10 years, through the adoption of recuperative furnaces, and the strain put on retorts to-day places the coefficient of endurance far beyond that dreamed of by Clegg and others.

Recent investigation shows that the same difficulty to introduce clay retorts was found in America, and the remark of a New England gentleman, that he would rather use a wooden box than a clay retort, is well known.

The credit of having first made clay retorts in this country I think justly belongs to Mr. B. Kreischer, and we cannot speak too highly of his enterprise and labor in perfecting and leading the way in this important department of the clay worker.

What are the pressures in the retort? They have been very seldom measured. On investigation it is found that the pressure curve fluctuates above and below a line of pressures, and itself presents numerous minute serratures. The fluctuations exceed a few inches of water, and appear to be mainly due to the want of perfectly uniform action in the exhaust; but such vacillations of pressure are in any case probably too small to affect the chemical processes going on in the retort.

The state of affairs is somewhat different when there is an obstruction in front of the retort, so that the gas produced is not immediately withdrawn and a high pressure is developed. Then there is a greater protection of graphite, and the permeability of the retort walls plays an important part. If too small, a pressure may possibly draw air in through the retort walls; too great a pressure will drive gas through them.

What is the permeability of retort walls? In order to investigate this the writer closed the end of an ascension pipe by a lateral pipe in the ascending main and the empty retort. The amount of gas so led in was measured by a meter, which enabled the escape of gas which took place when any given pressure was maintained in the retort to be measured. Everything was so arranged that there could be no escape of gas except through the retort walls. The retort had been at work for 4½ months and was thickly lined with graphite. It was found that, when the pressure was low, on the retort lined well with graphite the loss was very small. At 2 inches pressure it is just above 1 per cent., and over that pressure the loss increases rapidly. Freshly cleaned retorts lose gas indefinitely, but come right to an appreciable extent within 24 hours, or as soon as the first thin layer of graphite is deposited.

*Discussion.*

The President—Gentlemen, you have listened to an interesting, historically-considered paper on an important branch in the manufacture of coal gas. As there are points in the paper with which some of you may be familiar, I would like to hear you give an expression of your experience.

Mr. Eichbaum—To sum the matter up in the fewest words it should be said, if it were not for the positive carbon in the retorts, clay retorts could not be used. When a new bench is started very little gas comes out of it for the first hour or two, and it is only when it becomes coated with carbon, either in the shape of graphite or hard retort carbon, that one gets any good from the retort. It seems to me, if it were not for the positive carbon in the pores, and outside of the retort itself, it would be impossible to make gas, unless the retorts were kept under a constant, steady vacuum. The gas would go through almost as fast as made.

The President—I believe that is my experience. The first introduction of clay retorts in coal gas works in California, outside of San Francisco, might be credited to Napa. Using them without an exhauster, when the holder dropped and the gas went out through the chimney, I began to think I had gotten our Company into a nice mess, as well as myself. The consequence was I did not sleep much that night, thinking the town would be without gas the next day; but the accumulation of carbon came all right, and before evening we had our holder up in pretty good shape. We ran our bench for quite a while, being very careful with it, and in fact succeeded in keeping it going for 5½ years. That was certainly an extraordinary run, and I do not pretend to say we were making as much gas per mouthpiece as we could have done had the conditions required it. If we had, probably the life would have been a great deal less.

Mr. Jones—Sometimes it is an economical matter, instead of wasting good coal to put in a charge of coal tar. One can thus reduce the time for accumulating carbon about one-tenth.

Mr. Eichbaum—It may be a matter of interest for you to know that in some parts of England to day they build retorts of brick right in the furnace. Of course they use curved pieces for the bottom. I was in hopes Mr. Weber would touch on that in his paper. About six years ago in reading a discussion at one of the meetings of the British Gas Light Association in the *Journal of Gas Lighting*, at Chilton, I found they were still using retorts made of brick, and the writer contended it was the best and most economical way of building retorts. As that was only five years ago it looks that such form of retort has not yet gone out of use. In connection with this matter I would say that in my experience—if one has all the parts of a retort—it makes hardly any difference how badly broken they are, provided the fractures are in good shape, by putting them together with care, we have found that broken retorts will last as long as unbroken ones. We have had retorts mended in six or seven places, and others have had the same experience.

Mr. Jones—Some retorts in sections have been imported into this country. About 9 or 10 years ago the works in Marblehead, Mass., were equipped with built up retorts, and I think they are still in use. The durability of retorts shaped with appropriate flanges for making tight joints, I think is three or four times as great as that of a retort in one piece. In fact I believe the same retorts are still in use at Marblehead that were put in there 8 or 10 years ago. I have not heard of any change being made.

The President—You do not state that as being the origin of sectional retorts in the United States?

Mr. Jones—No; but mentioned as a recent introduction of them. They are still used in other places.

The President—In 1867 I saw retorts of that kind in use in a Montana gas works.

Mr. Jones—They have been used in many places and discarded, but Marblehead was mentioned as a case in point of the recent introduction of sectional retorts.

On motion of Mr. Clements a vote of thanks was tendered Mr. Weber for his paper.

The President here called upon the Secretary to read the paper, by Mr. F. Foveaux, of San Francisco, on

## GAS AS FUEL.

To the Members of the Pacific Coast Gas Association:

It is safe to say that less attention is being paid by managers of gas companies to the increasing of consumption by means of gas used as a fuel than to almost any other department of their business.

While the old saying is, "The dollars are made in the retort house," it is nevertheless true that much of the effort that is being made to manufacture gas cheaply might be expended in the effort to increase the consumption by the introduction of gas stoves of all sorts. Startling results from companies reporting show what can be done with the public, when appeals are made to them to try a stove, either on economical terms for the stove or by a reduction in the price of gas.

One company on the Coast has trebled its consumption for fuel purposes in the past two years, and increased the number of stoves placed from 300 to 1,400. Others have done as well in smaller proportions.

Different conditions arising in different localities make one rule hard to follow in the matter of plans to be adopted for the pushing of this trade, but each manager, by studying out his own territory, can certainly devise some scheme for the betterment of his output.

Usually no hesitation is experienced in getting a gas company to lay 100 feet of main to supply a customer for illumination, whose consumption would be uncertain; 100 feet of 3-inch cast iron pipe laid would cost not less than $25. A gas stove of first-class character can be introduced for not more than $15, the revenue from which is more certain and more profitable, and attended with less annoyance than the ordinary supply of gas for lighting purposes. Is not this a matter which should be more carefully considered, it being remembered that every percentage of increase of sales of gas for day purposes lessens the cost of production?

It is notorious that, while the general public may be most energetic kickers on the basis of the registration of meters when supplied for lighting purposes, there seldom, if ever, is a kick registered at the company's office for whatever may be shown as used for fuel purposes.

Gas is becoming more and more useful every day, for the public at large are commencing to appreciate the clean fuel, ready at any moment. Still there are many people who believe that gas is an expensive luxury, and unhealthful as fuel; and to educate them to a different idea should be our aim.

In using gas for heating the general idea is that it makes the atmosphere in the room very disagreeable, causing headache and giving unsatisfactory results, as people do not care to open doors and windows to get ventilation.

The greatest trouble lies in the construction of heaters. As a rule they consume all the air which we need for inhaling, which is of great importance, and the products of combustion are in most cases discharged into our living rooms. While most of the fire grates are supplied with a damper, the use of it is greatly misrepresented. People are instructed to close the damper when greater heat is required. This is

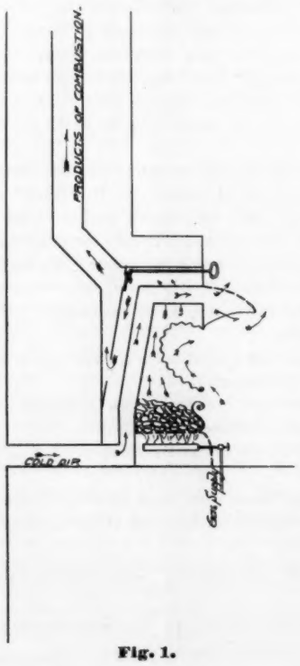



Fig. 1.

easily understood; but what, then, becomes of the products of combustion? They have to fall back into the room and naturally fill it with foul air and make the surrounding atmosphere unhealthful. Again, if instructions are given to keep the damper open, the best heat escapes into the chimney; and what is the result? A large gas bill at the end of the month and no heat; the consumer gets discouraged and has the gas heater removed.

In regard to cooking stoves. They are everywhere giving very good satisfaction, over 1,000,000 having been made during 1896. The San Francisco Gas and Electric Company have about 1,500 loan stoves in constant use.

Having given some study to the water heating question, and also heating water for household purposes, I must say that the economical solution of this certainly requires an improvement on our present system. The idea of using waste heat in a water back stove for cooking purposes is not very profitable, as sometimes when you want hot water there is no cooking being done; therefore, it is better to have a separate heater connected with the kitchen boiler or bathroom.

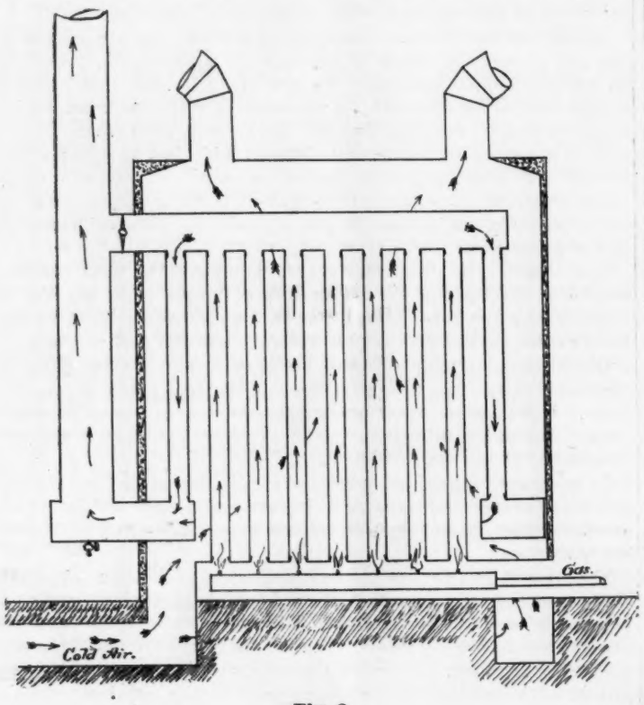



Fig. 2.

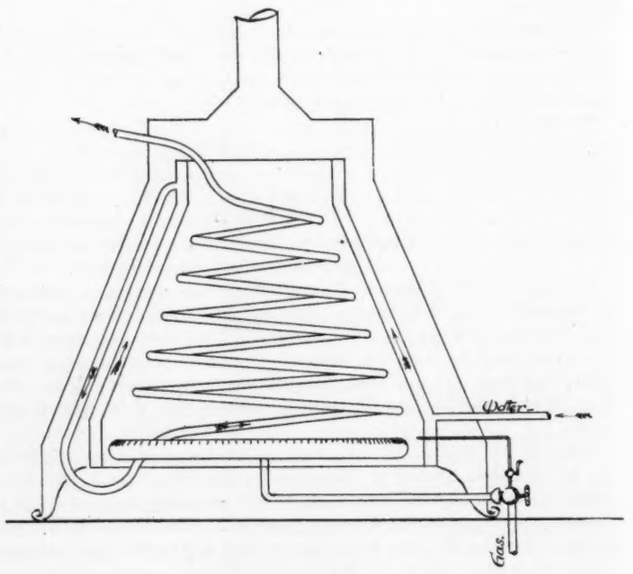



Fig. 3.

I have made some investigations to improve the methods by which gas is burned in ordinary stoves, and respectfully submit for your consideration the results of such endeavors on my part.

While not claiming any particular originality, I would like to invite

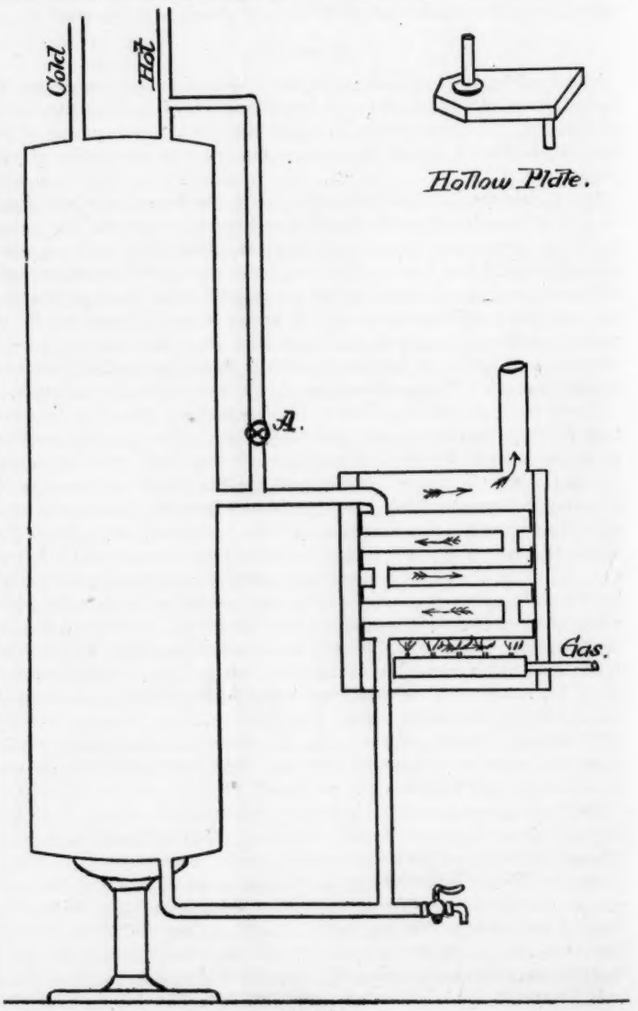



Fig. 4.

the criticism and opinion of the members, feeling that it is as much to the interest of each gas man as to an inventor that the proper methods of combustion should be applied to stoves with which they have so much to do.

To succeed in inducing the public to use gas as fuel it is necessary to look into the construction of heating appliances, and having succeeded in getting the proper heater there should be no trouble in increasing the daily output. To make my ideas more clearly understood, I have made four different illustrations.

Figure 1 represents the improved fire grate; Fig. 2 represents the improved hot water furnace; Fig. 3 represents the improved hot water generator; Fig. 4 represents the improved hot water generator.

To describe the different appliances and explain the improvements on them, begin with No. 1, the "Fire Grate."

The construction is of sheet steel and ornamental cast iron front, finished in bronze, brass or plated, The basket containing the artificial coke is made of wrought, ornamentally twisted, or of cast iron. The improvement on this grate to those already on the market, as shown in the drawing, depicts how the products of combustion are carried off into the chimney. In the back of this grate is a ventilation flue, which flue is connected with the outside atmosphere, and during the process of heating the room, the fresh air drawn from the outside is heated to a high temperature, and fills the room constantly with pure air. The foul air is drawn back to the burner and exhausted in the chimney.

The advantage of this grate to consumers is that it acts as a perfect ventilator and consumes less gas than any other fire grate on the market. Grates built on such lines will draw consumers and be a benefit to gas companies.

Fig. 2 shows the "Hot Air Gas Furnace." It is made round in form, 40 inches in diameter and 72 inches high, and has six 7-inch hot air outlets. It is constructed of a double galvanized sheet iron casing, leaving a space of 1 inch or 1½ inches for mineral wool or some non-conducting material. Inside the casing are the radiating tubes, 61 in number. They are 2 inches in diameter and about 4 feet long, and are made of No. 24 or No. 26 sheet steel. These tubes are connected on top and bottom to a cast iron disc. The bottom disc contains the Bunsen burner. The products of combustion pass up through the tubes, and, after reaching the top disc, take the downward course and finally pass out into the chimney. The cold air which is taken from a high point outside of the building is carried underneath the furnace. Now, then, after passing by all the radiating tubes, the air becomes very hot at the top, from where it passes into the flues of the different rooms. As the furnace contains about 150 square feet of radiating surface, and its construction is of light material, 48 to 50 cubic feet of gas per hour will give the best satisfaction to heat six rooms.

Figs. 3 and 4 show "Hot Water Generators." Some practical experiments have been made in the last two years and with very good results. No. 3 is only a proposal; but No. 4 is already in use in the city.

No. 3, as you see, is cone shaped, 12 inches in diameter on the bottom, 3 inches on the top, and 15 inches to 18 inches high. The cone is made double, leaving a space of ¾-inch for water. The top and the bottom of the cone has a solid ring, riveted and soldered. In the bottom of the cone is the cold water inlet. On the top is the outlet, and there it is connected to the copper coil or superheater, which is a ¾-inch copper pipe, and about 20 to 24 feet long; 20 to 25 cubic feet of gas per hour will give an excellent result.

No. 4 is a hot water generator already used some two years in this city. So far there have been no complaints, and those who have used the heater say that it works like a charm. The illustration will give you an idea of the construction and how water heaters should be connected to the boiler. For a small quantity and quick heating, the valve *A* should be opened; for bathing purposes it should be closed.

California is the ideal spot for gas heating, the short sharp spells of cold weather inducing the use of stoves that do not require hours to get ready and that can be dispensed with when the sun provokes enough warmth. Therefore we should make this matter an especial study, and if I have lead you into that line my paper will have accomplished its purpose.

*Discussion.*

Mr. Gregory—Of what are the tubes in No. 1 made?

Mr. Foveaux—Of Russia iron.

Mr. Gregory—I noticed a heater, by a manufacturer in San Jose, made of thin copper, with quite thin heads. Everything was calculated to be quite thin, so as to let the heat through the head, on very much the same principle as that advocated by Mr. Foveaux.

Mr. Foveaux—The discs are of cast iron, and the nozzles and tubes are made similar to the flue pipes for gas stoves. They are all of one length. It is easy to change, repair and put them together.

Mr. Tuthill—Would not those tubes burn out very easily?

Mr. Foveaux—They would not. They may rust out, but from the simplicity of design they can be replaced without any difficulty. The cost of the tubes would be nothing compared to the cost of our present furnaces. When using 48 or 50 feet per hour one will heat six rooms. Most of our grates adapted for heating rooms consume from 25 to 60 feet per hour, not giving the result people expect, and are rather expensive. Professor Simmons claims that from 8 to 10 feet of gas would be sufficient to heat an ordinary sized room with efficient apparatus. This system is also good for heating water. Most generators are either too complicated or expensive to be effective. The idea of the heater exhibited is to utilize the waste heat. The heater is made cone shaped, having a circular burner. Naturally, when the flame is rising the water will be first heated in the cone and then in the coil, coming out hot into the bathtub. [Mr. Foveaux then entered into a detailed description of the construction of the stoves and heaters, but as a careful examination of the illustrations in Mr. Foveaux's paper will carry his explations, his detailed description is omitted.]

The Secretary—Does it make any difference whether you have street pressure or tank pressure?

Mr. Foveaux—Yes, sir. Tank pressure I always recommend. Anyone who puts in a water heater which uses gas as fuel will be far better suited with tank pressure than with street pressure.

The Secretary—I recommend that very often, and it gives satisfaction to our customers. Where there is a very heavy street pressure of water, you cannot give satisfaction, but on putting in a tank you get along with half the pressure of gas, and make the heaters, that before were unsatisfactory and expensive, economical and satisfactory. I think it would be well for gas men whose consumers have difficulty with independent heaters, to put up themselves, at their own expense, a small tank to fit the boiler. With copper boilers having tanks we have no trouble at all. In fact, with the ordinary water-back stove it gives perfect satisfaction, for we can get hot water almost instantly. On galvanized iron boilers with street pressure we have difficulty all the time.

Mr. Foveaux—A small 5 or 6-gallon outside galvanized tank with an automatic feed is better than a connection direct from city pressure.

Mr. Kinney— I would ask if Mr. Foveaux has tried admitting the water from the jacket to the top of the coil instead of the bottom; that is, carrying the water circulation through the coil downward towards the burner?

Mr. Foveaux—It would not be a good arrangement. You would trap the water.

Mr. Symmes—I would ask if any of these heaters have been made?

Mr. Foveaux—This one was made, and it has given pretty good satisfaction. The rest of them are only ideas.

On motion, a vote of thanks was accorded Mr. Foveaux for his paper.

The President—The next number on the programme will be the paper on

## CARD BOOKKEEPING,

by Mr. V. Stow, of San Francisco, which paper was read by Mr. F. J. Symmes, as follows:

One morning when the writer called on business at the old office of the San Francisco Edison Light and Power Company, he was shown their card system of book-keeping, and being very much impressed with same he turned it over to his book-keeping department for investigation, with the result that it is being used in his own business with a great deal of satisfaction. He, therefore, recommends it for investigation to all the members of the Association, in the belief that it is well adapted to any business, and particularly so to the business of a gas company.

Its principal recommendations are economy of money, time and space. It is well-known that some accounts need no care other than necessary to get them on to the books properly and correctly; that is, they need no care in a collector's sense, while others need some care, and others all the care that it is possible to give them. By the use of the card system the good accounts can be placed by themselves, the accounts that need some nursing by themselves, and those that need a master hand also by themselves. The accounts that need the most attention can be looked at very frequently without the expenditure of time that it would take to go through all of the accounts. Then, again, if there are any accounts to be collected, on different lengths of time or different terms, they can be separated into different classifications accordingly without disturbing the general harmony of the system.

Time and convenience are also saved by this system in indexing, as the ledger under the card system indexes itself, and the index cannot get wrong or complicated. The ledger never wears out and never has to be replaced. This in a mercantile house saves not only money, but a great amount of time, as, by the old system of keeping accounts in books, every account, no matter how small or large, had to be transferred into the new book.

By the card system, when an account is obsolete or dead, the card on which that account was kept is removed from the ledger and put away in a place for the purpose. If the account is opened again that card is taken out and put back into the ledger without harm to anything.

The first objection that is made by people investigating this subject is that a card may get lost, and the account in that way would be lost also. This might be also said of money, because money may get lost. Do not have any of it. The card on which the account is kept is large, and could hardly get out of place in an office, so that it would not be discovered in a short time.

It seems to the writer peculiarly adaptable to the business of a gas company, as the accounts of meters could be kept by this system just as well as the cash accounts. The history of all accounts, as to whether they are good or not, can be kept on the account card, and when a man has ceased to be a consumer could be easily kept by this method. The details of the life of retorts and other apparatus could be kept in this way, as well as all stock accounts; and, if the superintendent chose, the pay roll of all his men. For instance, an employee would have a card with his name at the top, the rate of his wages would be indicated on same, the number of days he worked and the amount paid him. If that employee left or was discharged, the card bearing his name would be removed and another card substituted for it.

It, of course, is just as good for the electric light business as for the gas business, and where both are run in conjunction it seems to the writer that this would be a very handy way to keep the accounts of both departments, as each probably likes to know what it does relatively to the other.

This paper is not intended to be technical nor exhaustive. The aim is merely to excite the interest of the members to what seems to the writer to be a useful and successful invention. Some of the members may be fully satisfied with their present methods and do not care to change at all. To those, however, who are looking for improvements, this is heartily recommended, and any assistance toward getting an insight into it will be cheerfully given by the writer.

### *Discussion.*

Mr. Symmes—It was not intended by Mr. Stow that his paper should be rated to the character and dignity of those studied efforts already submitted; but, like a generous hearted man, having come across a good thing, he wanted that other people should know of it. Mr. Stow was very much interested in the subject, and it was introduced in our place of business (The Thomas Day Company) before he submitted his suggestions here. I might supplement what Mr. Stow has stated by saying that the card system, as I understand it, was originally devised purely as an index in connection with public libraries, and it is the growth of that index into the character of bookkeeping which has made it of service to business houses. If you wish to purchase a new ledger, instead of purchasing one with a cover on it, you simply purchase a set of pages, leaving them unbound. By that means you carry the names carefully indexed, place them in a box, and deposit the box in the safe at night, in place of a bound book. By that means you are able to use just as many sheets or pages as you desire, and never have to handle those which you do not need. It is a cumbersome method to take out a large book simply to find one page and to use one small account. By this method the cards are arranged in such a manner that you simply turn them over, picking out one card carrying an account that you wish to consult, which saves the difficulty and inconvenience of handling so much. In taking off a trial balance, and for the general use of a bookkeeper about the house, it is found practically to be a very excellent system, and our bookkeeper is so much pleased with the plan that we could hardly persuade him to go back to the old methods. I understand it is being used in a number of business houses, and is equally applicable to any kind of business. I will state further in connection with the subject that, as we hope to have a number of you visit the establishment of Thomas Day & Company this afternoon, we would be glad to show those interested how it is operated there.

The President—Gentlemen, this has been a very interesting "talk" on the matter of accounts. I presume the invitation of Mr. Symmes will be accepted, for an object lesson often accomplishes what oral teaching cannot reach.

Mr. Jones—Last week I had the pleasure of visiting Mr. Stow at his office. He explained his method of card bookkeeping to me very carefully, and I was exceedingly interested in it. About two years ago we adopted the card system of cataloguing our meters in the San Francisco Gas Light Company, and found no difficulty in keeping a complete index of over 25,000 meters by the card system. We have never lost a card, and we are extending the system to other departments of our business as rapidly as possible. I might say we use it as a list for indexing the signatures of our stockholders, and for other accounts in connection with keeping track of our stock; and it is very useful in keeping account of stock on hand, both in the storeroom and in the yards of the company. I am about to have made a card notebook. It is not new by any means, but I think it will be a great convenience. It was my intention to have it made before this meeting, so members might see it. Of course the ordinary gas man's notebook must be kept chronologically, and there is a great deal of difficulty in indexing the different notes, unless one can remember exactly the day or year he made the notes. I suppose you all have difficulty in indexing your letter books, and trouble in finding letters in the Shannon letter file, and all that sort of thing, but in the card index there is no difficulty at all. If you want to find a note about coal you simply turn to card C, where you have all your notes relating to coal in one card together. I think there are many ways in which our members can make use of this system to their advantage.

The Secretary—I have had a card system in use, so far as meters are concerned, similar to that of Mr. Jones. I got the idea from seeing what he was doing in preserving the record of his meters. He has not detailed what they show; I think he should in justice to himself. They show the company's number of meter, the maker's number, the date of its purchase, and where the meter has been. Every time it comes to the shop it is registered on that card, and the expenses of repairs to that meter are also put upon the card. So it at all times shows the exact condition of every meter, and its life and expense to the company. I have also adopted the system in conjunction with our electric lighting department. We have a card list of all our poles. We have about 2,500 poles of different sizes in our district—some lamp poles, ordinary line poles and junction poles; and that card shows the list of those, gives the exact location of each pole, the date it was bought, the date it was put into the ground and its cost, beside telling the number of cross-arms on the pole and the circuits that are on the cross-arms. If we have a 50-foot pole with five 8-pin arms, that is shown by a rubber stamp impression, made to represent a pole, on the back of the card, and on that are given the pins, the glasses and the numbers of the circuit marked in front of each pin. We have thus a complete and absolute record, and have extended it to other departments of our business as well. But that suffices to give you an idea of what may be done with it. I think it is one of the most useful things in the world. The man whom I think is entitled to the credit of it is a Mr. Langstroth, who first devised it for ordinary bookkeeping in the San Francisco Savings Union. Having such a multiplicity of accounts it was found impossible to keep them in the ordinary ledger or ledgers, and he devised this system. The bank now uses it entirely. I don't know how many depositors the bank has—probably 50,000.

Mr. Jones—May I ask how many years ago he got his patent?

The Secretary—He got a patent 12 or 15 years ago.

Mr. Jones—I thought the plan was originated by Mr. Windsor, the Librarian of the Boston Public Library. They had great difficulty in cataloguing, and I believe they devised this system.

The Secretary—Yes, so far as cataloguing was concerned; but its adaptability to bookkeeping was first devised by Mr. Langstroth.

Mr. Symmes—You are both right. Mr. Windsor devised it as a pure index for library use; but when the card was enlarged and more matter written on it, so that it took the place of the page of the ledger, I think Mr. Langstroth should be credited with the idea. At any rate he received a patent for it. It is adaptable to so many varieties that it is simply wonderful. You can use it on a small scale or on a large scale.

The Secretary—I think it would pay every manager of a gas company here to-day to look into that matter at Mr. Symmes' office. I think it will result in your adopting it for almost all your recording business before the next meeting of the Association.

Mr. Jones—I extend an invitation to all our members who have not seen our system of indexing our meters to look at the card box in the room next to my office, when they have the leisure.

Mr. Symmes—Members could ascertain more about it for their use from Mr. Jones' adaptation of it to meters than from ours, which is simply applying it to the ordinary system of bookkeeping in the office. We would be very glad to show it to you there; but, especially for your own use, perhaps you would get more satisfaction out of Mr.

Jones' illustration in the light and power department; and that is really where Mr. Stowe, as he states in his paper, first got the idea for our books. The bookkeeping department came more directly under his charge, and he was very much enthused about it.

Mr. Gregory—From the discussion I only see in my mind a ledger and cash book. I would like to ask if the daybook and the journal are done away with by this system.

Mr. Britton—No; simply the ledger is done away with. We do not dispense with the daybook or the journal. We cannot do that by card bookkeeping.

Mr. Geo. F. Summers—Card bookkeeping is applicable where there is a large number of small accounts to be kept. I do not believe in card bookkeeping where there are less than 1,000 accounts. In the Boston Public Library, where the system originated, it was found, when blank spaces were left in an index, that future information might be introduced in proper alphabetical position, the books became unwieldy. A card system was necessary to save room. I have used in the past ten years applications of this system in the matter of recording services, electric poles, deposits and index for note book. In connection with the last, it may be of interest to state that cards and filing cases come already made up with envelopes, the same size as the cards, for clippings and small papers. It is my experience that it is not advisable to use cards where books are admissible.

On motion of Mr. Clements the thanks of the Association were tendered to Mr. Stowe for his paper.

The President then invited an

EXPRESSION OF OPINION FROM MEMBERS WHO HAD VISITED THE GAS EXHIBITION IN NEW YORK LAST WINTER.

In response to this invitation Secretary Britton said:

Mr. President and Gentlemen—The Gas Exposition has now become a matter of history, and I have no doubt, through the time that has elapsed since its inception, all who attended are looking back with ever-increasing admiration for the genius that thought out the possibilities of such an exhibition of the appliances of the gas world. I do not think that too much praise can be accorded to Mr. Brown for the Napoleon-like manner in which he overcame all obstacles and presented to the gas people of the United States a showing of which they may feel proud.

I will attempt to give you my personal opinions and views of the Exposition, as noticed from an individual standpoint, without being governed or controlled in any way by the published accounts or reports of other representatives.

The first impression upon entering the building on the night of its opening was one of extreme disappointment. There seemed to be some intangible thing absent from the show, and until two or three visits had been made this feeling of something lacking did not wear off. The absence of motive power, for reasons which have been thoroughly exploited in the press, was possibly one of the causes which led to such a feeling on my part.

It would be impossible for me to particularize in the description of the different exhibits, as that has been done so long since by the gas journals as to have lost any interest for you. Necessarily the most noticeable thing was the lighting of the building by Welsbachs, thousands of them being displayed upon elegant fixtures, and in an artistic manner, so as to bring about the best results, producing an effect that could not possibly have been produced by electricity, no matter how fancifully arranged. The Tiffany tower was dimmed largely by the Welsbach booth immediately in front of it, and by the U. G. I. Company's masterful exhibition. It would be impossible to describe this tower, and it could only be appreciated by being seen. The U. G. I. Company's exhibit was certainly the grandest of all. Their register of gas men visiting the Exposition will in years to come be an exceedingly valuable document.

The gas stove manufacturers vied with each other in presenting their best faces to the public, and I have no doubt have been encouraged by increased sales for the outlay which they must have made.

Although I was not able to be present every night and day, having other business to attend to, I was not impressed particularly with the attendance. In the daytime it was very meager, and on one night, on which I was present, hardly filling the aisles of that immense Garden.

The exhibition of prepayment meters and gas machinery was all that could be desired, although I think that very little encouragement was given to Mr. Brown by the very small spaces taken by some of the exhibitors; some, when exhibiting at our Midwinter Fair, taking four or five times the space that they decided was necessary in Greater New York.

I do not think that sufficient attention was paid to the application of gas by means of appliances for educating the public, the different exhibitors showing individually, while a congregation of all the methods in one hall or space would have resulted in much greater good, as showing what was possible with the material we have for sale.

The banquet given by the manufacturers to the visiting gas men was a remarkable affair, under the supervision of Mr. Oscar B. Weber, and was voted a grand success.

I have noticed that none of the representatives of the different Associations made much mention of their visit at the meeting of the Association upon their return—at least very little was reported in the papers; and I think that many carried away with them the same feeling that I did, that, while the Exposition was more than realized so far as the promises of Mr. Brown were concerned, it was not altogether a complete success on the lines intended, and that it would be both unprofitable and inadvisable to repeat it very soon.

The torches lighted on the four towers of the building were quite an attraction, roaring out a welcome to the gas man many blocks away, when it was a novelty to the Pacific Coast gas representative to wade through two or three feet of snow with the temperature near zero.

Mr. Geo. F. Summers—The torches on the tower were the Wells' gasoline light. The electric letters on the tower received their current from a dynamo driven by an exhibitor's gas engine, both engine and generator being on the main floor. The cooking lectures were carried on in a lecture room and were well attended, doubtless an excellent advertisement for the local gas people. It may be remembered that, at the World's Fair, a committee of the first gas engineers in the country reported unfavorably concerning a gas exhibit, on account of the immense discouragements in a matter of this kind. When we consider that the Gas Industry Council, with over $70,000 at their disposal, could not see their way clear to take a small part in the Columbian Exposition, we must admit that it was a bold and plucky attempt on the part of the management of the Madison Square enterprise to promote the interests of the individual members of the gas industry by means of an exposition of this nature.

Mr. Jones—Do I understand you to say that the torches on the outside were the Wells' gasoline torch, such as is used in illuminating outside places?

Mr. Geo. F. Summers—Yes, sir; one on each corner of the tower; the Wells light.

The President—Mr. Russell, can you help out in a few remarks. I understand you were at the Exposition?

Mr. Russell—Yes, sir; I was there, and I concluded that it was a very fine thing, especially in regard to the Welsbach lights. They were all around. The ceiling and roof were lighted with these lights, and, on one side of the entrance as you went in, they had a very handsome booth fitted up with these lights. The main thing about the Welsbach illumination so far as the Tiffany tower is concerned was that the former very much outshone the latter. The tower itself was very beautiful, and there were a great many exhibits of other things that were very, very fine. Take it as a whole, I think it was a grand success all the way through, and I would like to see it repeated in about three years. I do not think it would be possible to make it a success every year, because the people who exhibited went to a very large expense, and I do not think they could stand it as an annual affair. As far as the public is concerned, the place was thronged. One afternoon I stood at the entrance—it was popularly supposed that the gas companies, and a great many manufacturers and exhibitors, purchased blocks of tickets and distributed them—waiting for a messenger, and I counted in three minutes about 40 people who came in, seven-eighths of whom paid. So it showed that the public were very much interested in the whole affair, or they would not have spent their money to see it. I thought that was a pretty good indication that it was looked well upon by the citizens at large.

Mr. Jones—I have a set of photographs of the Exposition, if any of the members would like to see them.

Mr. Kahn—I think I owe it to you gentlemen, and I think as in some degree associated with the gas industry I owe it to the enterprise in New York which we have just been discussing, and concerning which I am loth to interject my opinions, being a total stranger, to say a word or two about it. I think it is due to it, and I think it is due to you, that at least the opinion of an individual who went there to look at the gas exposition from the standpoint of its value as a factor for the popularization of fuel gas, should say what he thought about it. I was in New York for six or seven days in attendance at this Exhibition, and I spent chiefly the evenings there. I must say the impression that I carried away from that enterprise was exceedingly favorable. Certainly

that enterprise imposed an enormous task upon Mr. Brown, who was wholly unaided in that enterprise—whether he desired it to be so or not, of course I am not prepared to say; but he had associated with him very busy gentlemen, men of large affairs, who permitted the use of their names in connection with the enterprise, I think solely because of the prestige that they would give it, and because of the promise that was made to them that they would not be annoyed with any of the work. Mr. Brown had not more than four or five days—scarcely that much—to install that entire exhibition.

Mr. Britton—He had from Sunday morning until Wednesday night.

Mr. Kahn—I am glad you furnish that information. I thought it was a marvelous thing. I was in Paris at the Exposition in 1889. A gas exhibit was made there, and an enormous committee, composed of more than 60 men, had charge of that department. I am prepared to say to you, gentlemen, that, after months of preparation in Paris at the exhibition there, aided by the most expert talent obtainable in France, Belgium and England, they did not produce in my judgment one half as good an exhibition as they had in New York. I thought it was marvelous—the large amount of piping, the large amount of work needed to be done in that building, for which they paid, I forget how much rent a day—an enormous sum of money. Now, as to the attendance. The attendance was very large, I thought. I don't know whether the official publication has been made, but there were a great many people there during the evenings, and I am satisfied in my own mind that the Exhibition, in so far as it tended to popularize the use of fuel gas, served well a splendid purpose. I am furthermore prepared to say, in proof of that assertion, that I have never known in New York City when there were so many men and so many dealers there anxious to handle gas stoves, and when there were so many houses in the city of New York that have recently gone into the sale of gas appliances. This I attribute almost entirely to the encouragement which was furnished by that Exhibition. Now, gentlemen, I apologize to you for having said what I have, but I was prompted to do it solely and entirely because I felt that you should know that it is possible, through an Exhibition of that kind, to give people an idea of gas which they seem not now to possess, and that it is the only practical mode that I know of, in a public way at least, of furnishing the people with that sort of information which I know you all desire them to have, if you wish them to use your gas for fuel purposes.

The President then called upon Mr. M. C. Osborn, Editor of

THE WRINKLE DEPARTMENT,

to read his budget. In Mr. Osborn's absence the Secretary read as follows:

Mr. President and Gentlemen: The Wrinkle Department has been well supported by the members, as the perusal of the following will show, although you will notice that comparatively few of the members contributed. It is to be hoped hereafter that all will take a lively interest in making this department a still greater feature of our meetings, as its possibilities for the benefit of the gas industry are limited only with the interest taken by the members. I have noticed that in the discussion of wrinkles at our former meetings only one or two were discussed, not that others had not equal merit, but they were forgotten. I would suggest that an opportunity be given to discuss each wrinkle as it is read. Some of the contributors send the print of their wrinkle without an explanation, so in presenting them good points may be overlooked, but by a free discussion the shortcomings of your editor may be rectified.

*Wrinkle No.* 1 is a bicycle attachment for meter setters, and consists of a fork, made of ¼ by ¾-inch steel, extending about half way up the side of a 5-light meter; the second piece is bent at right angles with an oblong hole in the end. The attachment used as a lampholder is bent at right angles with the handlebar post, with a slot in end to admit bolt. The meter is placed in position and made fast to the bicycle by means of bolt and thumbscrew under the meter, an oblong hole allowing the fork in front to be adjusted to suit the different sizes of meters. The ends of forks are covered with leather to prevent scratching the meter. The second attachment is a leather pouch to hold a combination wrench and carry in the ordinary way as shown in the accompanying cut. Distance has no terrors for the meter man when thus equipped, and prompt service is assured.

*Wrinkle No.* 2 is an oil and tar burner, made by Engineer R. L. Clarke, of the San Diego Gas and Electric Light Company, and used under the boilers and benches. It consists of a brass casting with a side opening threaded for oil pipe and air cock, with an inner steam tube threaded into cap at back end of burner and extending its full length; the steam nozzle reduced to ¼ inch; the tar, steam and air uniting in the conical cap or main nozzle for the atomizing of the tar, the opening in the main nozzle being ¼ inch in diameter. The features claimed for this burner are that the oil spray is not enveloped in the steam, which is in the center, thus giving access of the air to the carbon of the spray immediately. By reducing the area of steam nozzle the maximum boiler pressure is maintained, thereby increasing the speed of the spray, also effecting a saving in steam. The flame of these burners is short and very white in color. In practice these burners use 1½ pounds of tar per horse power hour, or 5½ horse power hours per gallon of tar. One burner will furnish 50-horse power, with ash or clinkers on the grates.

*Wrinkle No.* 3, furnished by Mr. John R. Kempf, Jr., of Salt Lake, Utah, provides against any possible leaks in his cast iron pipe, with the apparatus shown in the print. It consists of a flange with a rubber seal, the flange being provided with a handle for convenience in working. The flange is placed over the end of the pipe and fastened by yoke and screw clamp. Two sets are necessary, one for the spigot and one for the bell end of pipe. Steam is introduced through a tap in the flange.

*Wrinkle No.* 4 shows the method employed to overcome the current that forms from the inlet to the outlet of holder during the hours of heavy output when they are situated close together, the grade of gas made being drawn over into the outlet pipe. Mr. L. F. Fogg, of San Francisco, drops the holder to bedrock, cuts a hole directly over the old outlet pipe, another at the point over the proposed outlet, near the center of a holder. Fit a light iron T over outlet pipe, slipping below the water line, and extend the pipe to hole at center of holder, the end being supported by an iron horse standing on bottom of tank. The holes made in crown of holder are repaired by plate and $\frac{3}{16}$-inch cap bolts. The gas now entering holder will mix before passing into the street mains.

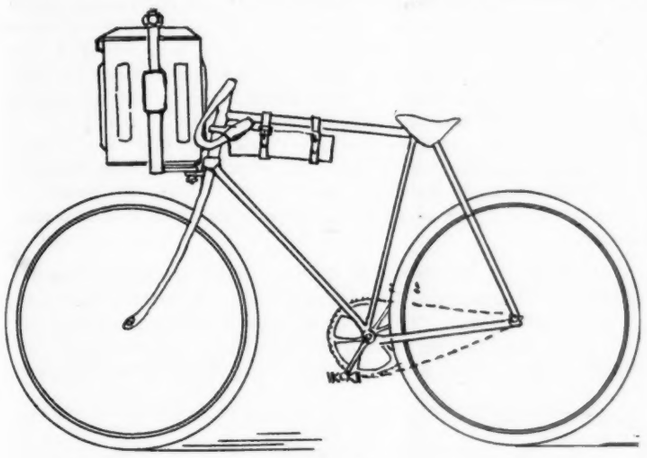
Mr. D. J. Collins, of Philadelphia, Pa., favors us with three wrinkles. He modestly says none of them is the product of his own efforts, but all were gathered from some of his associates of the United Gas Improvement Company.

*Wrinkle No.* 5 represents a feed water heater which may be improvised at any works. It utilizes the exhaust steam from the engines and pumps and will increase the efficiency of the boiler plant. The sketch illustrates the connections to be made. For a small plant barrels may be used for the water reservoirs *A* and *B*. *B* is the hot well, and the water is automatically maintained at a constant height by a float valve. *A* acts as a filter or skimmer and collects the oil from the steam. This reservoir may be cleaned by shutting off the suction to the pump and flushing the reservoirs with water from the pipe *C*, the oil being carried away through the overflow from the tank *A*. The pump should be set on a level, or below the level, of the water in *B*, otherwise vapor will be formed in the suction pipe and the pump will lose its suction. The reservoirs, hot water pipes and connections should be carefully insulated. A heater of this kind has supplied water for boiler use at a temperature of 200° F. The water in *B* may be made to boil by exhausting the steam from the pump directly into it.

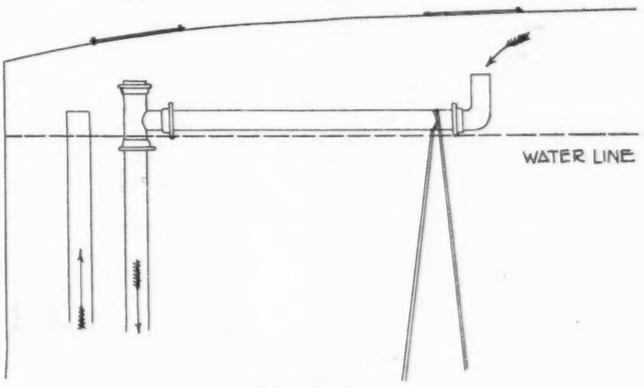
*Wrinkle No.* 6 provides for a check on the quantity of water in a drip by inserting into the drip a pipe having its lower end open at the height above which we do not want the water to rise. Supply gas to a burner in the office or works from this pipe and keep the burner lighted. If the water in the drip rises and seals the lower end of the pipe the burner will be extinguished and will indicate that the drip should be pumped. Holder outlet drips and other yard drips should be provided with this indicator. Street drips may be connected to street lamp in the same manner.

*Wrinkle No.* 7 describes an automatic relief valve for the top of an oil tank, when the tank is connected to the relief holder with a gas main. If the valve *V* is accidentally closed, or the pipe sealed, any expansion or contraction of the gas in the tank above the oil, or the pumping of oil in or out of the tank, will rupture the top of the tank; but with the relief valve any excess pressure is relieved by the gas breaking through the seal *S*, or a partial vacuum is relieved by the admission of air through a swinging check valve *C*. The seal *S* may be kept filled with water from the top of the tank by removing the coupling or nipple end, but during freezing weather the coupling should be replaced, and the seal filled with oil, or other liquid which will not freeze. The gas pipe connecting the holder and tank should always be provided with a drip pot, and this pot should be pumped regularly.

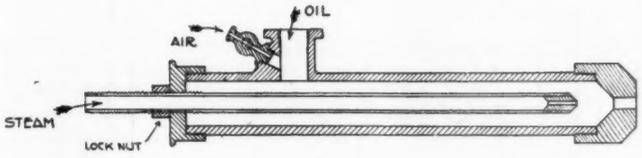
Mr. C. F. Adams, of Portland, Oregon, presents two wrinkles worthy of special mention.



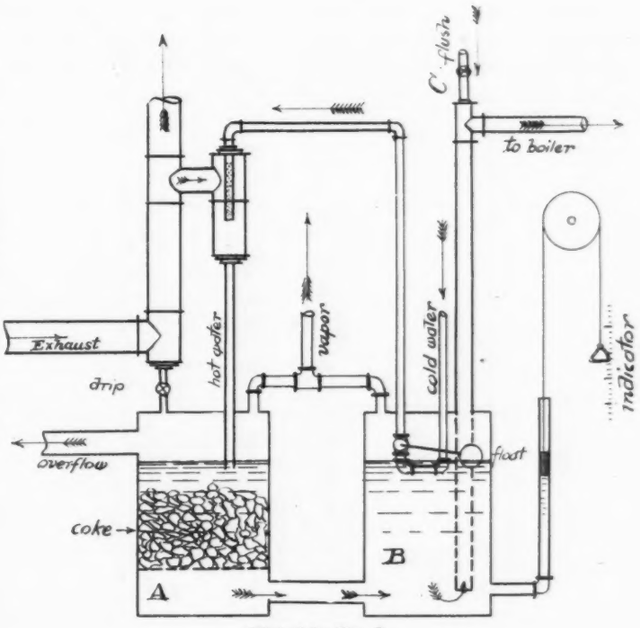
Wrinkle No. 1.




Wrinkle No. 4.




Wrinkle No. 2.

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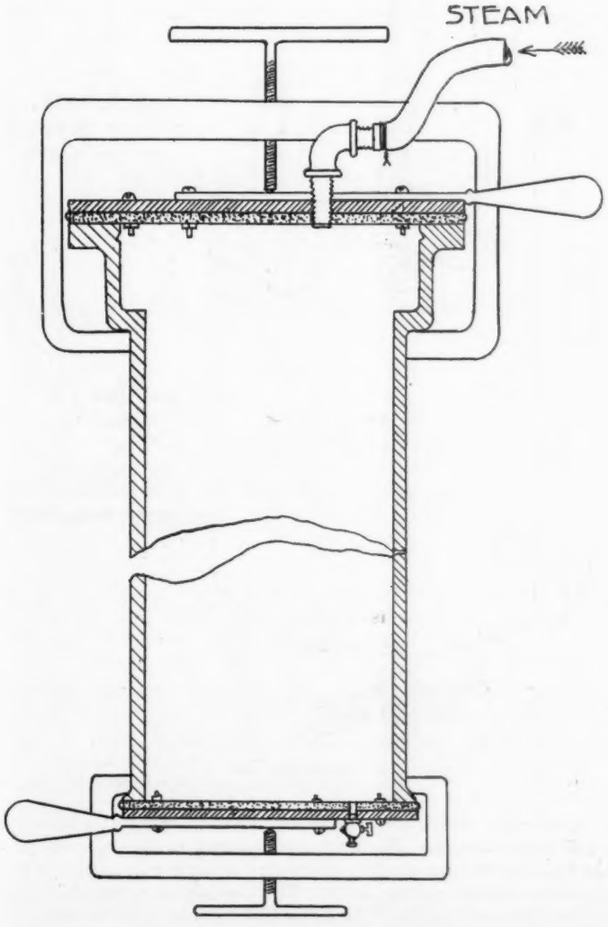


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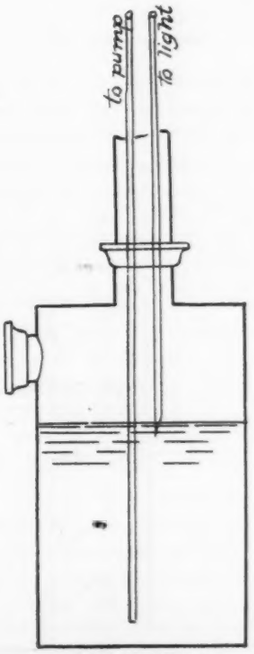


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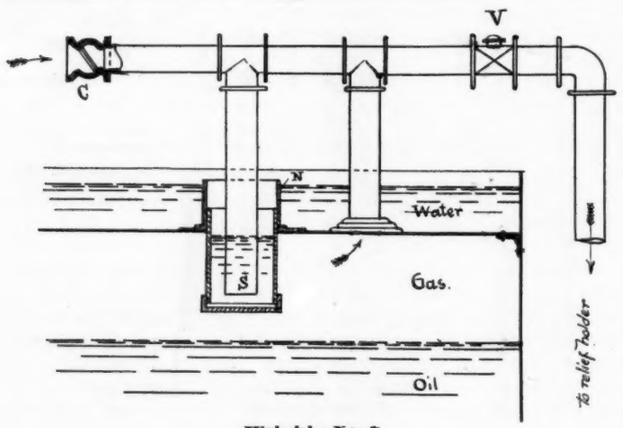
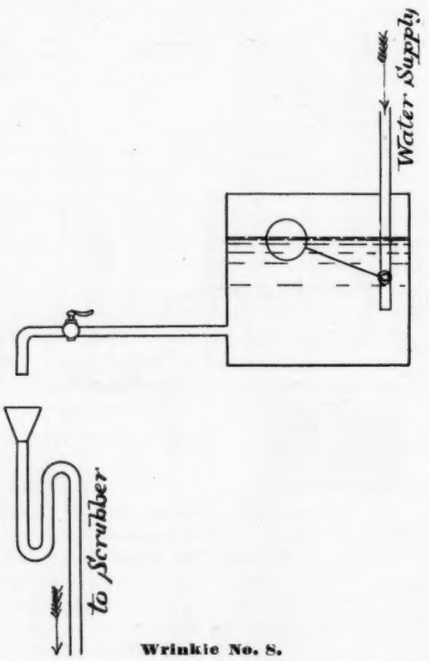



**Wrinkle No. 7.**

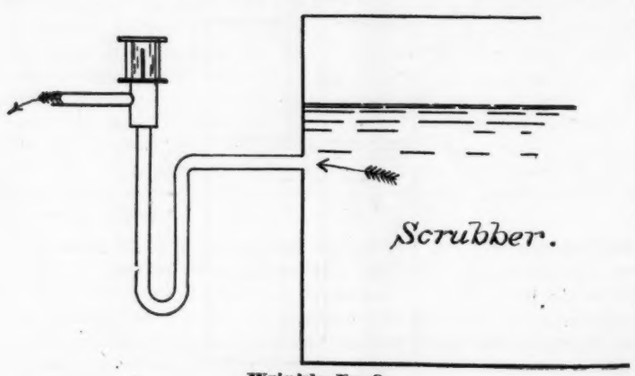
*Wrinkle No.* 8 is intended to regulate the flow of water used in the scrubber when the pressure on the supply pipe is irregular, and will also serve as a check when meter rates are paid for water. It consists




**Wrinkle No. 8.**

of a small tank with a float and valve to give proper head for uniform supply, needing regulation only when the make of gas is irregular. The water is introduced into scrubber by a trapped pipe ending in funnel.

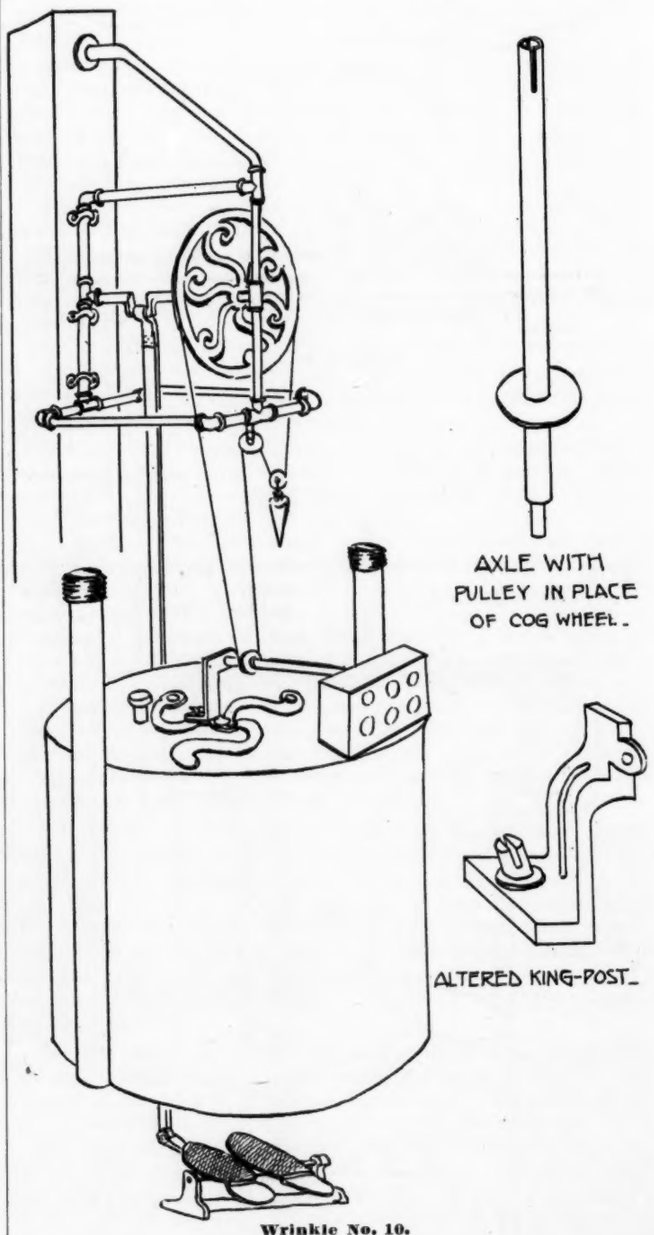
*Wrinkle No.* 9 is a contrivance placed at the outlet of scrubber to indicate to the operator the amount of water necessary to free the gas from ammonia, and at the same time keep the liquor as strong as possible. It consists of a 2-inch pipe, the top of which is on a line of the water in the scrubber and 2½ inches above the outlet of the jacket, the




**Wrinkle No. 9.**

object of this arrangement being to overcome any current disturbing the hydrometer. A glass is continued above the jacket for the protection of the hydrometer. The hydrometer used is an ordinary milk tester, and, after repeated tests, shows that the gas is free from ammonia when the hydrometer indicates about the same specific gravity as good milk. Wind a thread about the neck of the hydrometer at the point required, regulate the water by Wrinkle No. 8, and your gas will be free from ammonia and the liquor will be at the maximum strength. During the tests made the hydrometer showed the specific gravity of the ammoniacal liquor to be 1,030, water being 1,000 at normal temperature.

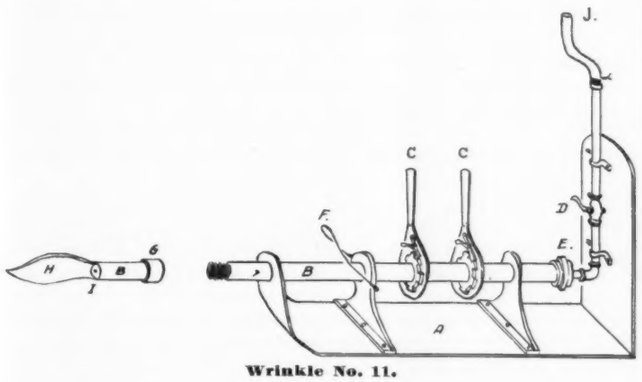
*Wrinkle No.* 10, by Mr. W. M. Parker, of San Francisco, is a gas meter dial setting machine and is home made. A detailed description of it is herewith given. The frame is made of ½-inch gas pipe, with a sewing machine driving wheel. A lead weight keeps the cord tight, either for large or small meters. A ¼-inch gas pipe acts as a crank rod.




**Wrinkle No. 10.**

On the floor is a sewing machine pedal. The line run over a brass pulley ½-inch in diameter. The king post of meter is shown, with parts taken off that are not needed. A chalk line is used as a driving belt. As you see, it runs by foot power. The machine does not cost much, and it works very rapidly. The screw in king post is the only thing to disconnect in changing from one meter to another.

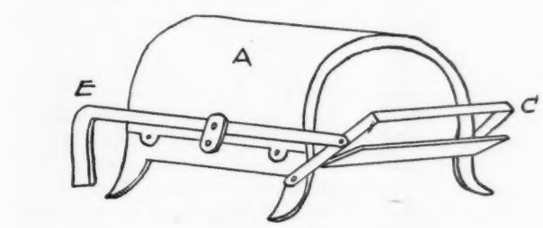
*Wrinkle No.* 11 by Mr. W. M. Parker, of San Francisco, is a machine for laying services under lawns or walks without destroying them. *A* is a sheet iron shoe, ¼ inch thick, 1 foot long by 6 inches wide; *B* is a 1-inch gas pipe, the ratchet cogs being shrunk on; *D*, the stop cock, regulates the water supply for eye or shuts the water off when adding a new length; *E* is a swivel to allow the ratchet and pipe to turn and keep the stopcock stationary; *F* is a loop on which to hitch a rope or block and tackle to assist the feeding or traveling of the



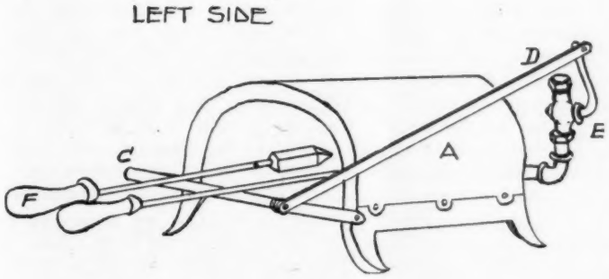

**Wrinkle No. 11.**

machine; *G* and *H* is the auger or pod; *I* is the pin hole that allows the water to strike the tip of the auger. The machine can be worked with or without water, as desired. By introducing services in this manner it insures tighter joints than by driving, and gives a better foundation for the service than by digging or tamping. It saves time and weighs about 10 pounds, and will lay pipe as large as 2 inch.

*Wrinkle No.* 12, by Mr. W. M. Parker, of San Francisco, is a soldering iron furnace with automatic gas service attachment, and consists of an ordinary gas soldering furnace with a swing bolted on the front for soldering iron handles to rest on. On the right hand side is a bar connecting the swing with furnace stopcock. On the left side is another




LEFT SIDE



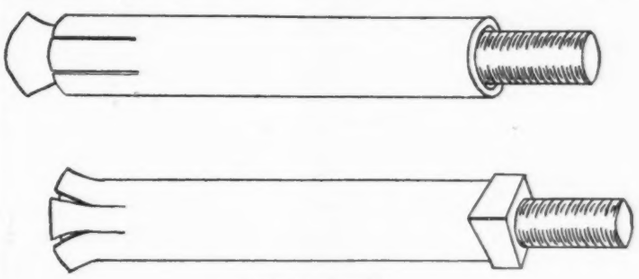

RIGHT SIDE

**Wrinkle No. 12.**

bar attached to the swing, the end being weighted to overcome the weight of the swing and friction of stopcock, the fulcrum being near the center. The irons are placed in the furnace, and the weight of the handles lowers the swing and turns on a full supply of gas, while the withdrawing of the irons reduces the flow of gas and is an economizer.

The following Wrinkles are submitted, the author's names being omitted, as they do not claim originality, but are considered of interest as you will find on examination. If you have ever had any bolts burn off in a hot wall you can appreciate

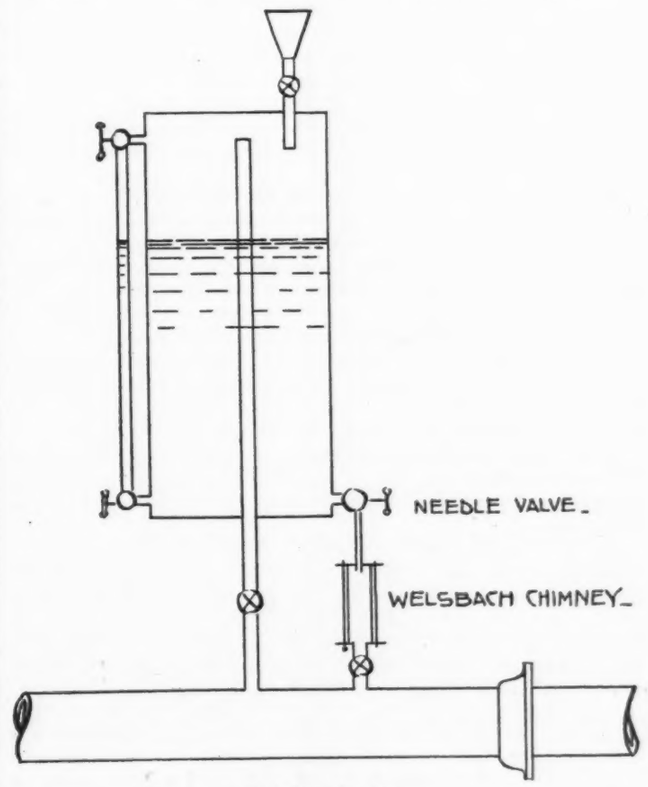
*Wrinkle No.* 13, which consists of a piece of gas pipe as long and large as the hole in the wall will admit. The pipe is sawed in four sections about half its length. The bolt having a countersunk head is placed in the pipe and both are inserted in the hole. As the bolt begins



**Wrinkle No. 13.**

to tighten the head spreads the sawed pipe and becomes tight. This Wrinkle was illustrated by actual bolts which were examined with much interest by the meeting.

*Wrinkle No.* 14 presents a convenient device for the introduction in mains of gasoline for cutting out naphthaline or for enriching purposes, and consists of a tank of proper size to suit the conditions with a




**Wrinkle No. 14.**

glass gauge to show operator the amount run out. A side valve with sight glass runs to gas main to show the amount being run. A very small stream will enrich a large amount of gas.

[To be Continued.]

## SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, August 10th, 1897.

*Gasholder Accident at Middlesbrough.—Sulphate of Ammonia.—Automatic Meters and Stoves on Hire in London.*

The report of Mr. Henry Woodall, the expert engaged to investigate into the causes of the accident to the gasholder at Middlesbrough, has been published, and it fully substantiates the remarks made by myself in describing the circumstances of the case. Mr. Woodall commences by stating that the structure in question is a three-lift holder, contained

in a steel plate tank 186½ feet in diameter and 30 feet deep, resting on the surface of the ground, and entirely without support, other than the inside rails primarily intended for the guidance of the holder. The foundation for the tank consisted of a bed of concrete 3 feet thick, which rested on a natural bed of clay 5 feet thick, and the subsoil was very unstable and marshy. Subsidence of the tank and concrete foundation commenced at once, and though the rate of sinking had not yet ceased, it was gradually lessening. The settlement round the circumference was irregular, with the result that one side was 6 inches lower than the other. In addition to this the weight of the tank and water had caused a sinkage of about 12 inches deep in the center, and over about three-fourths the diameter, so that the bottom of the tank is bulged, like an immense dish. This depression is evident on the concrete outside, which is inclined inwardly, and the slope continues for about 20 feet inside the tank. And consequently the inlet and outlet are thrown out of the perpendicular to the extent of over 2 feet. The circumstances of the accident are then considered. There was a squally south-west wind at the time, which was believed to have reached a maximum of 37 miles per hour during the night, and there is distinct evidence of the holder having received a twist from that quarter. This led to breakage of certain parts of the guiding device and canted the holder toward the south. Some of the broken casing fell and got wedged between the holder and the tank, tearing great gashes in the sideplates as the holder descended rapidly, in consequence of the tilting being sufficient to displace the water in the lutes. The two upper lifts are practically uninjured, being protected by the outer one, and Mr. Woodall rules that the contractors, Messrs. Ashmore & Co., are liable for the whole of the damage, as the commencement of the accident was due to failure of the guiding apparatus to the upper lift. With the exception of the substitution of diametric for circumferential guiding in the case of the upper lift, he recommends that the holder be reinstated as before.

The most interesting feature about this affair is the respective parts played by the new system of rope guiding, and the subsidence of the tank. It must be admitted that the latter was sufficient to disturb any arrangement of guiding. Few contractors, who happened to have the maintenance of a three-lift holder guided in the usual way on their hands, would care to have it tilted to the extent of 6 inches by way of a test. So what happened to the rope guiding device on this occasion is scarcely a fair criterion of what might be expected under the normal perpendicular. Most contractors estimate on the basis of a rigid tank and are unable to deal with the possibilities concerned in a subsiding one. The chief lesson is that, however wise or economical it may be to leave the holder without rigid guides, the tank should be braced or stiffened to resist strains that tend to alter its shape, and that on bad ground something should be done in the way of extending the foundation area.

Thursday week was rather an eventful day for sulphate of ammonia. A largely attended and influential meeting, representing at least two-thirds of the total production throughout the country, assembled at the famous Cannon Street Hotel, London, and inaugurated an Association for promoting the interests of the makers of that article. While almost at the same hour Mr. A. Bell, of Dalkeith, the President of the North British Association of Gas Managers, was making some new and interesting information about the agricultural value of sulphate, the principal feature of his inaugral address. The history of the sulphate market is a striking commentary upon a statement made by Mr. Bell on this occasion to the effect that gas engineers need not only a technical but also a commercial education. He shows that not only is sulphate quite equal to nitrate of soda, but unmeasurably superior, and that the reason why nitrate fetches a higher price is simply because it has been advertised and pushed in every possible way by a wealthy and influential committee appointed for the purpose, while sulphate has been left to the tender mercies of the market, to fight its way unaided. Mr. Bell makes out a very strong case on behalf of sulphate and supports himself with chapter and verse for each point. His arguments do not admit of compression sufficient for the limits of this letter, but I strongly advise all who are interested in the commercial value of sulphate to read them in full. He shows that by the lack of a vigorous and united policy similar to that of the Nitrate Committee, the manufacturers of sulphate have and are sustaining a serious loss. And his views were re-echoed to the full at the London meeting, who recognize this fact and have arranged to take prompt measures by way of remedy. Meanwhile, with the spread of technical knowledge, it is possible to promote a fair local trade in any agricultural district. In my own case, leaflets giving an analysis of the sulphate by a well-known authority and other published information on the uses of sulphate for various kinds of crops, were issued to agents and large consumers early in the spring, with the result that the whole stock was entirely sold out before midsummer. The whole of the ammoniacal liquor in stock was worked up, and in all some 40 tons of sulphate were disposed of either direct to users, or through agents for artificial manures. I think that while other agents are sold by the medium of dealers who attend every market, it is useless for gas companies to think of entering into competition and establish a direct trade. They would do better by securing the interests of the dealers in the same way as the proprietors and vendors of other manures. If an agent has a steady trade in Brown's turnip dressing, Smith's wheat manure, or Jones' magic fertiliser, and earns a good commission thereon, it is not likely that he will sit quietly by and allow sulphate to be recommended as equal or superior to these preparations. At the same time he is well known and respected in agricultural circles, and his word carries more weight than that of a stranger who has something to sell.

The two London gas companies have issued their respective statements of accounts for the half year ended June 30th, and both record a large increase in sale of gas—10 per cent. at the South Metropolitan, and 7 per cent. in the case of The Gas Light and Coke Co. This large increase is a most uncommon experience throughout the country, and, as in the two cases before us, has been largely influenced by the continued demand for automatic meters and appliances on hire. The Gas Light and Coke Company have now 228,900 consumers by ordinary meter, and 65,124 by automatic meters, while the number of heating and cooking stoves on hire is 54,389. And the South Metropolitan Company have 84,465 ordinary consumers, and 61,269 automatic. Of stoves on hire the ordinary consumers have 35,012 and the automatic 47,573, besides which there are 7,428 fires. Though somewhat late in the day in taking up the system of letting on hire the London companies are now gaining ground. The Gas Light and Coke Company have about one stove out to five consumers. But the success of the South Metropolitan is phenomenal. Taking the ordinary business alone, to which most of the gas fires may safely be credited, the appliances on hire are over half the number of consumers, while nearly 80 per cent. of the automatic class take stoves on hire. With a total of 157,000 consumers there are 90,000 appliances on hire, while their neighbors have only placed 54,389 amongst 294,000 consumers. Investigations amongst provincial gas undertakings show similar eccentricities in the matter of letting on hire, and the status or circumstance of the consumers does not in all cases furnish a sufficient explanation. Nor are the companies afraid to spend money in developing these new branches of trade. The Gas Light and Coke Company received £13,420 for hire during the six months, an increase of nearly £2,000 on the corresponding period of last year. But they expended nearly double that sum on stove fixing, renewals and repairs. Their neighbors received nearly a similar sum, viz., £13,229, which is somewhat remarkable considering they have a much larger number of stoves out. They must be a smaller class of goods or else let at lower rates. And the expenditure for repairs of stoves and fittings was only about £10,000, from which it appears that after a fair allowance for depreciation the hiring department pays its own way in this case. While there may be circumstances of a special character that warrant the subsidizing of the hire department from the general funds, as a rule it is only fair that it should support itself, and the charges for rent should be based on that understanding.

While gas companies are continually being reminded of the benefits they receive from the public, it rarely happens that we are shown the other side of the shield. And yet there is a good case to be made. It is a local industry, and few of this class dispense a larger proportion of the total income in wages. Of the total receipts for gas a considerable fraction is returned, to be circulated in the district, over the wages counters at the close of each week. And when we read of the 150,000 gas stoves in London, one cannot help thinking, apart from the additional labor employed, of the effect this must have on the public health and comfort, as regards the purity of the atmosphere. While the Smoke Abatement Committee have been talking, this cause has been quietly working, reducing the production of smoke, dust and soot. The number of stoves above instanced, as compard with the total number of consumers, represents one to three; so it is by no means an exaggeration to discuss the effect of the use of coal gas for domestic purposes, upon the purity of the air in London and our other large towns. If the black clouds of smoke and soot, which at times hang over London like a funeral pall, not only interfere with public comfort but also with public health, surely anyone who can propose a remedy is entitled to credit as a public benefactor. And it can scarcely be denied that the

enterprise which has resulted in the purchase and fixing of the 150,000 stoves comes under that head. This is a fact which in course of time will be appreciated at its proper value, and may therefore serve as an encouragement to those who, like the London Gas Companies, spare neither pains nor expense in extending the uses of gas.

## ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

SECRETARY DAVID H. VAN AUKEN has been authorized by the proprietors of the Cohoes (N. Y.) Gas Light Company, to make the announcement that on and after September 1st the selling rate will be $1.75 per 1,000 cubic feet, a concession of 25 cents per 1,000.

THE gas rate at Salem, Mass., has been reduced to $1.30 per 1,000 cubic feet, net.

MR. HECTOR V. LOVING, President of the Louisville (Ky.) Trust Company, has been elected a Director in the Louisville Gas Company, vice Mr. Udolpho Snead, resigned.

ADVICES by way of Pittsburgh, Pa., are to the effect that the ordinance granting the Pittsburgh Coke and Gas Company right of way to lay gas mains through the borough of Reynoldton has been passed over the veto of the Burgesses, at a special meeting of the Borough Council. It is also said that work will be commenced at once on the placing of the connecting main between the Company's plant at Glassport to McKeesport, at which latter place junction will be made with the mains of McKeesport and Union Gas Companies.

UNDER the franchise by which the J. W. McClurg Gas Company is authorized to erect and maintain a gas plant at East Liverpool, O., it is stipulated that the plant shall be in operation by April 1st, 1898.

ARTICLES incorporating the Peoples Gas Company, of Irvington, N. J., have been filed with the Secretary of State, of New Jersey. The capital stock is returned at $50,000, of which it is said $25,000 is paid in. The incorporators are: Philip N. Jackson, L. D. H. Gilmour and Dudley Farrand, of Newark; Percy Ingalls, of Verona; and Thomas H. Jones, James S. Edwards, James Mortland, Franklin Kissam, W. L. Glorieux, Frederick Stone, Geo. H. Wooley, Chas. M. Harrison and Thomas S. Osborne, of Irvington.

ALD. ALBRECHT, of the Dubuque (Ia.) City Council, is responsible for the introduction of an ordinance that directs the Key City Gas Company to put its maximum selling rate at $1 per 1,000 cubic feet. The ruling rates are: For an illuminating supply, $1.75 per 1,000; for a fuel supply, $1.50.

THE Allentown (Pa.) Gas Company's power plant is to be largely increased. The planning, among other provisions, includes the placing of a 100-horse boiler.

THE proprietors of the Logan Iron Works, of Brooklyn, N. Y., have secured the contract for the construction, at College Point, L. I., of a standpipe, in connection with the improved water supply of that place. The dimension of the tower is to be 125 feet in height and 35 feet in diameter.

WE understand that the contracts for the proposed gas plant, at Newport News, Va., have been awarded.

AT the annual meeting of the Stockton (Cal.) Gas and Electric Company the officers chosen were: Directors, Oliver Eldridge, F. A. Hihn, Alfred T. Eastland, W. J. Dutton, W. E. Brown, G. C. Hyatt and H. E. Adams; President, Oliver Eldridge; Vice-President, F. A. Hihn; Secretary, A. T. Eastland.

MR. GEORGE C. HOLBERTON, who has acted as Superintendent of the Centralia (Wash.) Water Supply Company for a short while, resigned that position to accept the Superintendency of the Bangkok (Siam) Gas and Electric Light Company. The lighting concession in Bangkok is owned by an American named Bennett.

THE main offices of the Lawrence (Mass.) Gas Company are to be removed to a more central location, the place selected being the building known as the Shattuck Block. The alterations necessary to the Company's purpose will be completed by or before November 1st.

IN our issue for August 9th, it was said, "Mr. J. A. McCollum, formerly in charge of the plant at Riverside, Cal., has been appointed Superintendent of the Wright Gas Company, Lorain, O." The statement was in error, for although Mr. McCollum has taken service with the Wright Gas Company, his real position with it is as gas maker. Mr. S. J. McClune is still the Wright Company's superintendent.

THE Chicago *Inter-Ocean* says: "It is expected that the new refunding mortgage of the Peoples' Gas Light and Coke Company will be authorized about the 1st of September. The mortgage will provide for a total issue of bonds, about $10,000,000 in excess of the present outstanding obligations of the companies included in the consolidation. These issues, with their dates of maturity and interest rates, are as follows:

| | |
|---|---|
| Chicago Gas Light and Coke, 5 per cent, due 1897 | $10,000,000 |
| Peoples' Gas Light and Coke, 6 per cent., due 1904 | 4,600,000 |
| Peoples' Gas Light and Coke, 6 per cent., due 1943 | 4,900,000 |
| Equitable Gas Light and Fuel, 6 per cent., due 1905 | 2,000,000 |
| Consumers' Gas, 5 per cent., due 1936 | 4,346,000 |
| Lake Gas, 5 per cent., due 1915 | 300,000 |
| Illinois Light, Heat and Power, 7 per cent., due 1914 | 500,000 |
| Economic Fuel, 5 per cent., due 1916 | 2,500,000 |
| Total | $29,146,000 |

"The new mortgage issue will provide that bonds may be put out for extensions and improvements as the money is required. These will bear 5 per cent. No interest rate will be fixed for the bonds, which are to be issued to refund outstanding bonds as they mature. The mortgage will provide that these are to bear the current rate of interest for like obligations at the time they are issued."

THE gas consumers of Passaic, N. J., have been complaining recently that their burners seemed to be clogged up, the clogging naturally cutting down materially the amount of light that should accompany the combustion of a stated number of feet of gas. The complaint eventually appeared in the columns of the local newspapers, which publication led General Spencer, Vice-President of the Passaic Lighting Company, to make the following explanation: "Some of our customers have been annoyed by the clogging of their burners. This has been caused by the change at the works from purifying with lime to oxide of iron, and it is always the case when the purifying system at a gas works is so changed. The Lighting Company has spent $10,000 putting in a new purifying system of the kind approved by the larger gas companies in New York and elsewhere, which will result in a finished gas, the use of which will be appreciated by our consumers. The Company will be glad if persons whose burners are clogged up from the change will notify the general office, when new burners will be put in without any charge."

THE following is the latest card of scale rates issued by the Bakersfield (Cal.) Gas and Electric Light Company, for service on account of its electric supply:

*Incandescent lights; business houses.*—Lights (16-candle power), run until 10 P.M., $1.20 each per month; until 12 P.M., $1.45; all night, $2. Discounts, 10 lights and under 15, 5 per cent. off; 15 lights and under 20, 10 per cent.; 20 lights and under 25, 15 per cent.; 25 lights and under 30, 20 per cent. Prompt cash payment entitles the user to a further rebate of 10 per cent.

*Incandescent lights; residences;* 16-candle power; rates per light per month:

| | Single Lights. | Two Lights. | Three Lights. |
|---|---|---|---|
| Halls | 50 cents. | 45 cents. | 40 cents. |
| Parlors | 35 " | 35 " | 30 " |
| Sitting rooms | 60 " | 60 " | 55 " |
| Dining rooms | 50 " | 50 " | 45 " |
| Kitchens | 40 " | 35 " | 35 " |
| Bedrooms | 30 " | 25 " | 25 " |
| Other rooms | 25 " | 20 " | 20 " |

Prompt payment entitles the user to a rebate of 10 per cent.

*Fan Motor Rates;* rates are for continuous service if desired.—1-12th or 1-8th-horse power, $2 per month; ¼-horse power, $2.50 per month; ½-horse power, $3 per month. The 10 per cent. discount for prompt cash payment also applies for the above service; in fact, the same discount rules on all classes of electric service.

*Arc lighting; indoor use.*—Rates are per week for 1,200 candle power lights: Lights until 10 P.M., daily except Sunday, $3; until 12 P.M., $3.50; all night, $4.50.

*Arc lighting; outdoor use.*—Rates are per week, 1,200-candle power: Lights run until 10 P.M., daily, $2.75; until 12 P.M., daily, $3; all night, daily, $3.50.

*Motor power schedule—*

| Motor. | Rate per Horse Power per Month. | Rate per Horse Power per Year. |
|---|---|---|
| 1/12-horse power | $12.00 | $144.00 |
| 1/8 " | 12.00 | 144.00 |
| 1/4 " | 12.00 | 144.00 |
| 1/3 " | 10.00 | 120.00 |
| 1 " | 7.50 | 90.00 |
| 2 " | 7.00 | 84.00 |
| 3 " | 6.67 | 80.00 |
| 5 " | 6 00 | 72.00 |
| 7½ " | 5.50 | 66.00 |
| 10 " | 5.00 | 60.00 |
| 15 " | 5.00 | 60.00 |
| 20 " | 5.00 | 60.00 |

THE City Council of Vancouver, B. C., has decided not to submit a by-law to the voters directing them to ballot upon the proposition that the city should take over the plant of the Vancouver Gas Company for operation on municipal account. The queer thing about the determination is that it was reached mainly through the arguments advanced by certain councilmen that the competition of electricity is sharp enough and pronounced enough to indicate that gas is a back number. Ha, ha, ha!

THE generating plant of the Kankakee (Ills.) Gas Works is being renewed and enlarged.

THE Common Council of Port Huron, Mich., has refused to amend the charter of the local fuel gas company, in the direction indicated in a recent issue of the JOURNAL.

A CORRESPONDENT at Indianapolis, Ind., forwards the following: Judge Baker has granted a temporary injunction in the matter of the proceedings instituted by the Indianapolis Gas Company against the Mayor and City Council of Indianapolis to prevent the enforcement of the ordinance ordering a reduction in the gas rate to 75 cents, from $1.25 per 1,000 cubic feet. The injunction is to have force until the matters in contention are finally adjudged, and the Company in the interim is to furnish sufficient guarantee or bond that, in case the validity of the ordinance is eventually established, the consumers shall have returned to them the difference in their payments between the $1.25 and the 75 cent rate. Judge Baker says:

"The defendant insists that this Court cannot take jurisdiction of this case because both parties are citizens of this State. The same objection was made in the case of the Citizens' Street Railway Company vs. the City Railway Company, 56 Fed. rep., 746. This Court overruled the objection, and on appeal the Supreme Court, 166 U. S., 557, affirmed the decision of this Court, declaring that its jurisdiction was undoubted, on the ground that the suit was one arising under the Constitution of the United States. These cases are conclusive on the jurisdiction of this Court in the present case.

"The Supreme Court has declared in many cases that there is a remedy in the courts for relief against legislation establishing a tariff of rates which is so unreasonable as to practically destroy the value of property of companies engaged in the carrying business, and especially may the courts of the United States treat such a question as a judicial one, and hold such act of legislation to be in conflict with the constitution of the United States, as depriving the company of their property without due process of law, and as depriving them of the equal protection of the law. The principle extends to and protects all corporations and persons engaged, as is the complainant, in quasi public employments, whether the deprivation of their property without due process of law or the deprivation of the equal protection of the law arises from a legislative enactment or a municipal ordinance. In this case no denial has been made of the truth of the facts set out in the bill of complaint which is supported by affidavits. These facts must, therefore, for the purposes of the present application for a temporary restoring order, be taken to be true. Assuming all the facts so alleged to be true, in my opinion a case is presented which entitles the complainant to invoke to the judgment of the court as to whether or not the ordinance in question will practically deprive it of its property without due process of law, and also deprive it of the equal protection of the law by compelling it to sell its artificial gas without any return therefrom in the way of profit.

"Whether a temporary restraining order ought to be granted pending such judicial inquiry will depend largely on the character and extent of the injury to the one party or the other from the granting or refusing of it. It is settled that upon a preliminary application for a temporary restraining order all that the judge should, as a general rule, require is a case of probable right and of probable danger to that right without the interference of the court; and his discretion should then be regulated by the balance of inconvenience or injury to the one part or the other, 72 Fed. Rep., 952.

"It is evident, if the restraining order is refused and the ordinance should eventually be held invalid, the injury resulting to the complainant from its enforcement would be practically irremediable, because of the number of its patrons and the small amount to be recovered from each. On the other hand, if a temporary restraining order is granted until the validity of the ordinance can be judicially determined, the rights of the city can be fully protected by requiring the complainant to give a bond that will pay to the city the amount collected by it in excess of the rate prescribed by the ordinance in the event that such ordinance shall be adjudged to be valid.

"The Court, therefore, will award a temporary restraining order *pendente lite*, as prayed for in the bill of complaint, upon the complainant entering into an undertaking with the sureties to the approval of the Clerk of this Court in substance as follows:

"We undertake and promise to pay to the city of Indianapolis a sum equal to two-fifths of all sums of money collected or received by the Indianapolis Gas Company, from or on account of the sale of artificial gas during the pendency of the temporary restraining order granted in the above entitled cause without any relief whatever from valuation or appraisement laws, and with attorneys' fees, if said Indianapolis Gas Company shall fail to obtain a perpetual injunction, as prayed for in its bill of complaint. The Clerk will enter a temporary restraining order as prayed for on the giving of the undertaking above required."

THE *Sci. Am.* says that the University of California has $4,000,000 already pledged for its support, and asks architects to compete for the plans for the new buildings, and a jury of famous architects has been secured to pass upon the plans. The jury is to meet at Antwerp as soon as the plans are completed. The competition is to be international. An advisory board has been selected to fix upon such location as will best suit the landscape. On this board are Alma Tadema, Puvis de Chavannes, Andre, Luciain and Knaus.

## Acetone in the Acetylene Industry.

The *Am. Manufacturer* remarks that studies by Claude and Hesse seem to have shown conclusively that acetone, by its ability to absorb large quantities of acetylene, is well suited to store up several liters of this gas in a small volume. For this reason it may be of interest to our readers to learn something of the chemical properties of acetone.

Acetone is an organic substance belonging to the ketone group. It can be considered the product of oxidation of the isopropyl alcohol. It is a colorless liquid, in smell and taste resembling the rue, a wild plant of pungent smell and bitter taste. It is soluble in all conditions, in water, alcohol, sulphuric ether, chloroform, etc. It can be separated from the watery solution by addition of chloride of calcium. One liter acetone weighs at 0° C. 814 grams, it boils between 56° and 58° C., and burns with a luminous flame without smoke. A watery solution of acetone in the proportion of 1 part of acetone to 1 part of water can be ignited easily with a match. Such inflammability, however, ceases with 5 parts of water to 1 part of acetone. Acetone is obtained by the dry distillation of acetate of calcium. Attending impurities are empyreumatic tar substances, acetic acid, aldehyde, ethylene and water.

A watery solution of acetone should become neither dim nor milky when shaken. A disoloration would announce the presence of animal or vegetable substances. A red coloring would indicate the presence of acids, usually acetic acid. When an ammoniacal solution of nitrate of silver is added, and the mixture slightly heated, no black deposit of metallic silver should form, as otherwise the presence of aldehyde or vegetable substances would be established.

Acetone should not contain water, the presence of which can easily be discovered by bringing it in contact with carbonate of potash. If the acetone contains no water, the potash remains dry. When acetone is evaporated on a clean watch glass, no trace is left on the latter.

In order to ascertain the presence of water in acetone, Luigi Castellani proposes calcium carbide as the simplest means for all who occupy themselves with acetylene. A small lump of calcium carbide thrown into anhydric acetone will produce no bubbles, but in acetone with 2 to 3 per cent, of water small bubbles of acetylene gas are developed in the liquid, which, however, seldom reach the surface of the liquid, because the acetylene dissolves in it.

Calcium carbide, when added to a mixture consisting of equal parts of water and acetone, dissolves, and such a quantity of small gas bubbles is developed as to form a rather dense foam resembling the foam of beer. The price of acetone in Germany, where it is mostly manufactured, is about $1.30 a gallon.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

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ELBERT P. CALLENDER,
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CHAS. E. SANDERSON,
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MONDAY, AUGUST 30, 1897.

## The Market for Gas Securities.

The market for city gas shares showed during the week rather more animation than usual, the activity extending to every class of local securities. Traders were somewhat in evidence over Consolidated, but their efforts, so far as the short side was concerned, were lacking in force. To-day (Friday) the bid rate at noon was 188½ ex. div. of 2 per cent., which is payable Sept. 15th. Careful study of the situation leads to the conclusion that the amalgamation terms have finally been sifted, and that the union of interests will be legally completed during the fall, and quite likely at an early period therein.

New York and East River common has again gone over the 90 mark, and perhaps the feature of the situation was the pronounced strength of Standard common, which is 132 bid. On intrinsic merit the shares are not worth that money; but as anything is merchantable at the price offered for it, holders are not worrying themselves as to underlying values. Mutual is reported at 270 to 275, and Equitable is quoted at 260 to 265. Our advice is that the best thing on the list is Consolidated, with Mutual a good second.

In out-of-town shares, Brooklyn Union is firmly held at 120 to 120½. The Company is making and is preparing to make other extensions to its service which will add greatly to the corporation's earning powers. Some of its advocates are not slow in asserting that the dividend will be increased to 7 per cent. per annum. Whether or not the return will be advanced does not interfere with the fact that the Company is earning 7 per cent. and more. Chicago gas is very steady; in fact strong. It is bid for at 102½ ex. div. of 1½ per cent. The thought that the Universal Company will be taken into the Consolidated Company grows stronger as time goes by.

The feature of the outside market is the sharp advance in Laclede, which is reported at 43¾ to 44. As a rule, all outside gas securities are in demand at better figures than those reported in them for many months. It looks that Baltimore Consolidated (at 59 to 60) is cheap, and that Bay State also affords fair opportunity for profit, at anything under 16.

## Gas Stocks.

**Quotations by Cochran & Close, Brokers and Dealers in Gas Stocks.**

35 WALL ST., NEW YORK CITY.

AUGUST 30.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

| *N. Y. City Companies.* | *Capital.* | *Par.* | *Bid.* | *Asked.* |
|---|---|---|---|---|
| Consolidated | $35,430,000 | 100 | 188½ | 189½x |
| Central | 500,000 | 50 | 195 | .. |
| " Scrip | 220,000 | .. | 100 | . |
| Equitable | 4,000,000 | 100 | 260 | 263 |
| Bonds, 6's | 1,000,000 | 1,000 | 105 | .. |
| " 1st Con. 5's | 2,300,000 | 1,000 | 114 | . |
| Metropolitan Bonds | 658,000 | .. | 108 | 112 |
| Mutual | 3,500,000 | 100 | 270 | 275 |
| " Bonds | 1,500,000 | 1,000 | 100 | 102 |
| Municipal Bonds | 750,000 | . | .. | . |
| Northern | 150,000 | 50 | 85 | |
| " Bonds | 150,000 | 1,000 | .. | 98 |
| New York and East River | 5,000,000 | 100 | 90 | 91½ |
| Preferred | 2,000,000 | 100 | 118 | 120 |
| Bonds 1st 5's | 3,500,000 | 1,000 | 112 | 113 |
| " 1st Con. 5's | 1,500,000 | .. | 105 | 106½ |
| Richmond Co., S. I. | 348,650 | 50 | 50 | .. |
| " Bonds | 100,000 | 1,000 | .. | .. |
| Standard | 5,000,000 | 100 | 132 | 136 |
| Preferred | 5,000,000 | 100 | 142 | 150 |
| Bonds, 1st Mortgage, 5's | 1,500,000 | 1,000 | 114 | 115 |
| Yonkers | 299,650 | 50 | 130 | . |
| *Out-of-Town Companies.* | | | | |
| Brooklyn Union | 15,000,000 | 100 | 120 | 120¼ |
| " " Bonds (5's) | 15,000,000 | 1,000 | 113½ | 114 |
| Bay State | 15,000,000 | 50 | 15¾ | 16⅛ |
| " Income Bonds | 2,000,000 | 1,000 | .. | 35 |
| Boston United Gas Co.— | | | | |
| 1s Series S. F. Trust | 7,000,000 | 1,000 | 90 | 92 |
| 2d " " " | 3,000,000 | 1,000 | 74 | 75 |
| Buffalo Mutual | 750,000 | 100 | 125 | .. |
| " Bonds | 200,000 | 1,000 | 95 | 100 |
| Central, San Francisco | 2,000,000 | .. | 95 | .. |
| Chicago Gas Co. | 25,000,000 | 100 | 102¼ | 102¾ |
| Chicago Gas Lt. & Coke Co. Guaranteed Gold Bonds. | 7,650,000 | 1,000 | 104 | 104¼ |
| Columbus | 1,069,000 | . | 80 | 87 |
| 1st Mortgage | 1,085,000 | .. | .. | 96 |
| Consumers, Jersey City | 2,000,000 | 100 | 73 | 77 |
| " Bonds | 600,000 | 1,000 | 101½ | 108 |
| Cincinnati G. & C. Co. | 8,500,000 | 100 | 203 | 203½ |
| Consumers, Toronto | 1,600,000 | 50 | 184½ | 187 |
| Capital, Sacramento | 500,000 | 50 | .. | 35 |
| Bonds (6's) | 150,000 | 1,000 | .. | .. |
| Consolidated, Baltimore | 1,000,000 | 100 | 59 | 60 |
| Mortgage, 6's | 3,600,000 | .. | 107 | 107½ |
| Chesapeake, 1st 6's | 1,000,000 | .. | .. | .. |
| Equitable, 1st 6's | 910,000 | .. | .. | .. |
| Consolidated, 1st 5's | 1,490,000 | .. | .. | .. |
| Detroit | 4,000,000 | . | 34½ | 35 |
| " Con. Bonds | 4,312,000 | .. | 85 | 88½ |
| Equitable Gas & Fuel Co., Chicago, Bonds | 2,000,000 | 1,000 | .. | 101 |
| Fort Wayne | 2,000,000 | .. | 83 | 84 |
| " Bonds | 2,000,000 | .. | 93 | 95 |
| Hartford | 750,000 | 25 | .. | 145 |
| Indianapolis | 2,000,000 | .. | 152 | 155 |
| " Bonds, 6's | 2,650,000 | .. | 107 | 109 |
| Jersey City | 750,000 | 20 | 180 | .. |
| Lafayette Gas Co., Ind. | 1,000,000 | 100 | 88 | 89 |
| Bonds | 1,000,000 | 1,000 | 92 | 94 |
| Louisville | 2,570,000 | 50 | .. | .. |
| Laclede, St. Louis | 7,500,000 | 100 | 43¾ | 44 |
| Preferred | 2,500,000 | 100 | 92 | 95 |
| Bonds | 9,034,400 | 1,000 | 101½ | 102 |
| Little Falls, N. Y. | 50,000 | 100 | .. | 100 |
| Bonds | 25,000 | .. | .. | 100 |
| Montreal, Canada | 2,000,000 | 100 | 200 | . |
| Newark, N. J., Gas Co. | 1,000,000 | .. | 142 | .. |
| Bonds, 6's | 4,000,000 | .. | 123 | .. |
| New Haven | 1,000,000 | 25 | 225 | .. |
| Oakland, Cal. | 2,000,000 | .. | 53½ | 54 |
| " Bonds | 750,000 | .. | .. | .. |
| Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage | 20,100,00 | 1,000 | .. | 108 |
| 2d " | 2,500,000 | 1,000 | 104 | 105 |
| Peoples, Jersey City | 500,000 | 50 | .. | 175 |
| Rochester Gas & Elec. Co. | 2,150,000 | 50 | .. | .. |
| Preferred | 2,150,000 | 50 | 88 | .. |
| Consolidated 5's | 2,000,000 | .. | 87½ | 90 |
| San Francisco, Cal. | 10,000,000 | 100 | 94 | 94½ |
| St. Paul Gas Light Co. | 1,500,000 | 100 | 49 | 51 |
| 1st Mortgage, 6's | 650,000 | .. | 84 | 87 |
| Extension, 6's | 600,000 | .. | .. | .. |
| General Mortgage, 5's | 2,400,000 | . | 88 | 90 |
| Syracuse, N. Y. | 500,000 | 25 | .. | .. |
| Washington, D. C. | 2,000,000 | 20 | 250 | .. |
| Western, Milwaukee | 4,000,000 | 100 | 87 | 88 |
| Bonds, 5's | 3,556,000 | . | 98 | 100 |
| Wilmington, Del. | 550,000 | 50 | 100 | 2.2 |

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## NOTICE.

OFFICE OF MENDOTA LIGHT AND HEAT CO., MENDOTA, ILLS., July 28th, 1897.

MR. A. M. SUTHERLAND, New York:

Dear Sir—In answer to yours of 24th, we are glad to be able to assure you that there is no foundation whatever for the story told by your business rivals, who say we have thrown out your Water Gas Apparatus. We have operated it right along since it was built, and continue to do so, to our entire satisfaction, making excellent gas, which we sell at $1 per 1,000. We wish you success.

CHAS. LATHROP, Supt.
H. KOROPP, Sec.

## DIVIDEND NOTICE.

OFFICE OF WELSBACH COMMERCIAL COMPANY, 40 WALL ST., NEW YORK CITY, August 12, 1897.

The Directors have this day declared a quarterly dividend of two (2) per cent. on the preferred stock, payable Sept. 10, 1897, to stockholders of record at the close of business Aug. 31. Transfer books of the preferred stock will be closed from Sept. 1 to Sept. 10, both inclusive. Checks will be mailed

1159-3 EDWARD C. LEE, Treasurer.

## WANTED,

by a practical gas man,

**A Position as Fitter, Foreman or Superintendent,**

where ability would be appreciated. References. Address BALLANTINE, 14 East 132d St.,

1160-1 New York City.

## SUPERINTENDENT WANTED.

An energetic young man to take charge of a Water Gas Plant near New York City. Large and growing territory. Modern Lowe apparatus of 250,000 cu. ft. capacity. Twenty miles of mains. Twelve million cu. ft. output. Ability and careful management will assure a steady increase in the business, and will be duly appreciated. Address

1160-1 "W. C. T.," care this Journal.

## POSITION WANTED.

Graduate M.E., 27 years of age, desires engagement as Superintendent of Gas (Coal or Water) or Gas and Electric Light Works. Laboratory work and draughting a specialty.

Address "ENGINEER,"

1158-tf Care this Journal.

## Position Wanted.

A young, active man wants the management of a gas property, or the position of Assistant Superintendent at a gas or electric plant. Address

1157-tf "G. F. S.," care this Journal.

## Position Desired

**As Superintendent of Gas Works,**

by a thoroughly competent man.

1157-tf Address "W.," care this Journal.

## Position Desired

**As Superintendent of Gas Works or Gas and Electric Light Works,**

By a man 34 years of age. Sixteen years' experience in the manufacture and distribution of Coal Gas as Supt., and four years in the Electric line. Thoroughly competent to take charge of any plant, separately or combined. A practical mechanic, and understands the erection of gas plants and everything pertaining to the business. Not afraid of work. Salary no object until ability is proven. Best of references.

1102-tf Address "M. E. J.," care this Journal.

## Wanted to Buy,

**A Good Gas Plant.**

Must pay well.

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**A Small Gas and Electric Light Plant,**

in a Southern city of 3,800 inhabitants.

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**Hydraulic, Dip, Branch and Ascension Pipes, Mouthpieces and Lids,** for four Benches of 5's and for one Bench of 3 retorts.

**Two Coolers, or Air Condensers,** each of 150'000 cubic feet capacity.

**Multitubular Condenser,** shell, 36 in. diameter, with 98 2-in. tubes, 10 ft. 6 in. long.

**D-Shaped Tar Extractor,** 8 ft. long, 1 ft. 6 in. deep.

**Scrubber,** 48 in. diameter, 11 ft. 9 in. high. Three man holes, 11 in. by 15 in.

**8-inch Center Seal. Four Purifiers,** 8 ft. x 6 ft.

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**Coarse or Fine, Hard or Soft.**

**AN IDEAL COKE FOR WATER GAS.**

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**Shipping Facilities by River and Rail.**

**Sales Office, 311 Lewis Bldg., PITTSBURGH, PA.**

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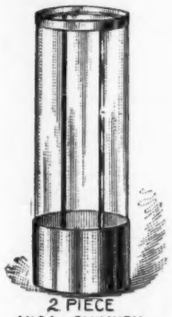

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Ammonia Concentrator.

Not Expensive. Write to STROH & OSIUS, Pat'ees, or Mich. Ammonia Works, Detroit, Mich.

## The Gas Engineer's Laboratory Handbook.

BY JOHN HORNBY, F.I.C. Price, $2.50.

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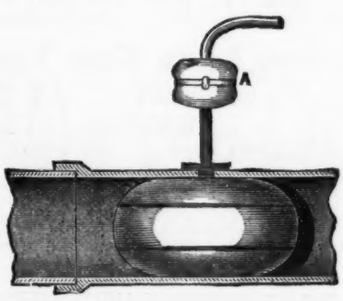
## Peerless Patent Improved Gas Bag




These Gas Bags are used to stop the flow of gas while repairing or making alterations in gas mains. There have been numerous cases of workmen being badly injured, and sometimes fatally, by the escape of gas resulting from the bursting of a bag, and our patent improvement is designed to obviate such calamities. The indicator *A* shows unerringly when the bag has been sufficiently inflated to pack the main, and when the pumping should be stopped. Our Bags are made of a rubber stock especially prepared to admit of great distension, and to resist the action of Oils, Gases, Naphtha and other residuum in the mains, and they are made with lapped joints, which adds greatly to their strength.

| | | | | | |
|---|---|---|---|---|---|
| 3-in. Gas Bag, each, | | $0.60 | 12-in. Gas Bag, each, | | $5.00 |
| 4 " | " | .80 | 16 " | " | 8.25 |
| 5 " | " | 1.05 | 20 " | " | 12.00 |
| 6 " | " | 1.75 | 24 " | " | 17.00 |
| 8 " | " | 2.65 | 30 " | " | 27.50 |
| 10 " | " | 3.75 | | | |

The Peerless Rubber Mfg. Co.

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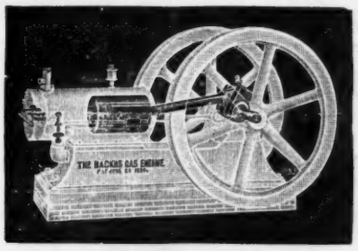

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Home Office, Backus Water Motor Co., Newark, N. J.

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## The Pioneer Vertical Water-Tube Boiler of the World!

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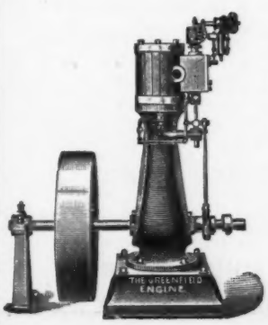


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Also Horizontal, Automatic and Variable Cut-off Engines.

Sizes from 3 to 75 Horse Power.

Also Vertical and Horizontal and Marine Boilers. Steam Pumps and Adams' Grate Bars.

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***Are Suitable for All Pressures and Conditions, and for Efficiency, Economy and Durability are Unrivaled.***

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Every Burner is stamped with name and trade mark. Cheap and inferior imitations are constantly coming in and going out of use, and we respectfully warn the trade against this kind of deception, as it causes loss and discredit to the trade and damage to the gas industry.

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OF ALL KINDS.

GAS GOVERNORS,
GAS FURNACES,
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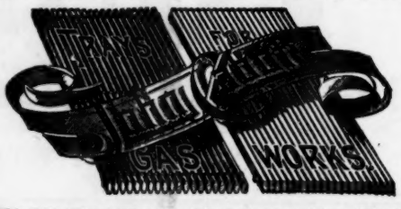
Reversible, Strongest, Most Durable, Most Easily Repaired.

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ALL SIZES AND SHAPES.

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ON THE CONSTRUCTION AND WORKING OF

**Regenerator Furnaces,**

By MAURICE GRAHAM, C.E.

**Price, $1.25.**

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WILDER'S VOLUMETRIC GOVERNORS.

They control the pressure at the burner, and deliver the quantity for which they are set regardless of high or low pressure in the supply.

**WELSBACH LIGHTS** are fully controlled, and the governors soon pay for themselves by preventing the breaking of mantles and chimneys. Thousands are already in use. Orders may be given to the Welsbach Co., or sent to ourselves.

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**COKE CARS,** for handling hot coke directly from retorts.

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The difficulty of handling hot coke directly from the retorts led us to design a special car for this purpose, with an arrangement of piping which sends a spray of water over the entire surface of the sides and bottom, preventing the steel from becoming overheated when the hot coke is drawn into the car. This is not intended to entirely quench the coke, which is done in the usual manner, but to keep the iron from getting red hot, and, at the same time, to partially quench the coke.

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The Patentees of the above, after several years' experience, finding that the enormous weight of the iron sheets (forming the washing discs) caused undue wear of the shafts and consequent fractures of the latter, introduced their Patent Wooden "Grid Segments." These "segments" have now been fitted in some hundreds of Patent "Standard" Washer-Scrubbers, and are universally admitted to be a great improvement upon the out of date pattern.

The Patentees beg to refer Engineers to recent issues of the AMERICAN GAS LIGHT JOURNAL for testimonials as to the efficiency of their improvements and will be glad to quote for complete machines or for "grid segments" for fitting in old pattern Washer-Scrubbers, the manufacture to be English or American at engineer's option. If for any *special reason* iron sheets are preferred, the Patentees will quote for them, but they do not recommend same.

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## GASHOLDERS, with or without Steel Tanks.

Purifiers, Condensers, Scrubbers. Oil Tanks, Smoke Stacks.

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PLATE AND STRUCTURAL WORK OF EVERY DESCRIPTION.

**THE ANDERSON Patent Cutter Carrying Link**
Made in all sizes.

Will cut from 2 in. to 24 in.
**Pipe Cutting Tool**

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BLOCKS, TILES, FIREBRICKS, FIRE CEMENT,
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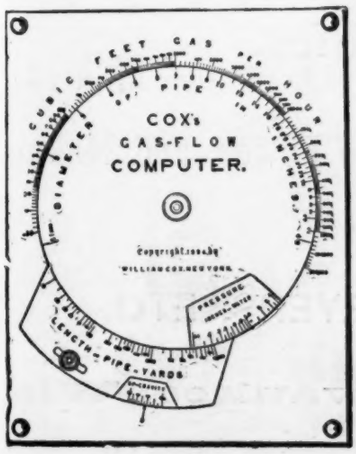


# Cox's Gas Flow Computer.

1. It gives at a glance the discharge of gas from pipes 1 to 48 inches in diameter and 10 to 10,000 yds. long, for any pressure from 0.01 to 10.0 inches of water, and any specific gravity from 0.40 to 1.00.
2. When the required discharge and the length of pipe are given, the diameter corresponding to any pressure is at once seen.
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4. Any suitable combination of the different factors of any problem, under all possible conditions, may be immediately found.

**It Prevents Errors and Saves Hours of Tiresome Calculations.**

**Price, $5.00, per Registered Mail.**

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**Undertakes all Kinds of Construction Work, Especially for the Manufacture of Gas from Caking Coal.**

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Exhausters, Blowers, etc.

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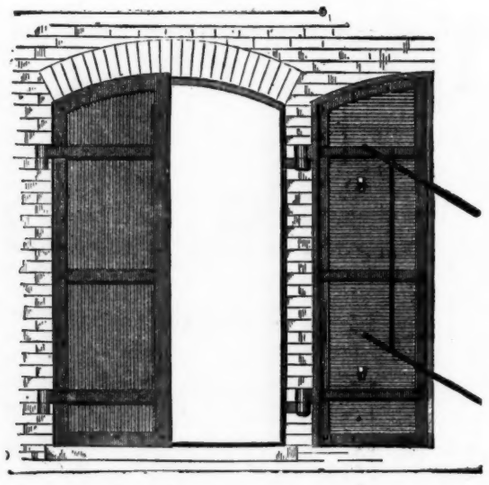

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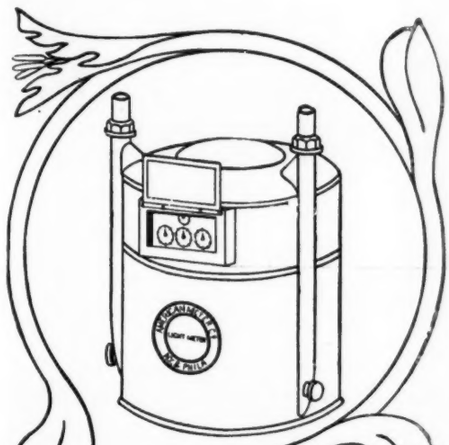

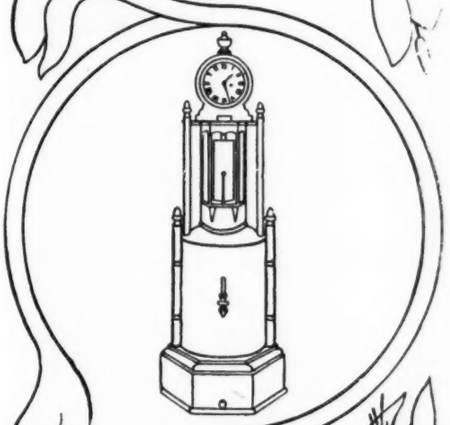

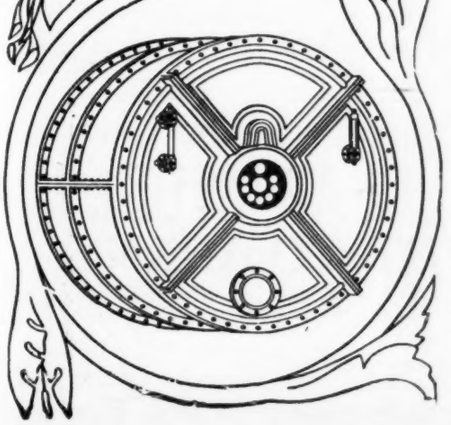

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# AMERICAN METER CO.

ESTABLISHED 1834. INCORPORATED 1863.

**NEW YORK AND PHILADELPHIA,**

**CHICAGO, ST. LOUIS,**

**SAN FRANCISCO.**

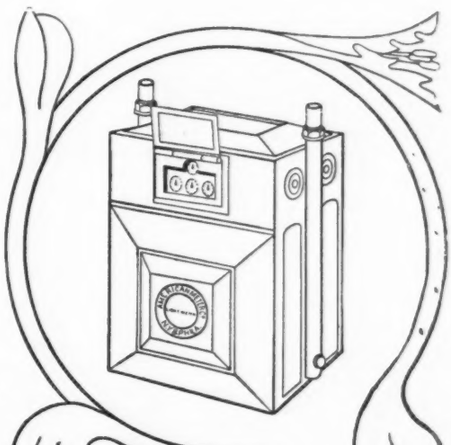
## PUBLIC LIGHTING TABLE.

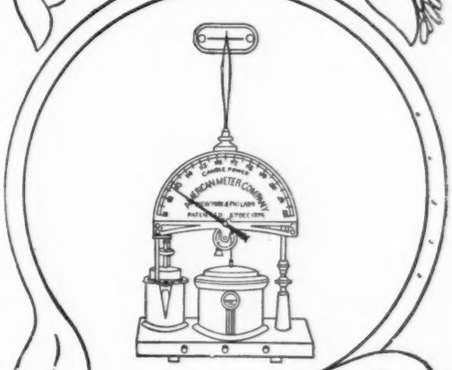
### SEPTEMBER, 1897.

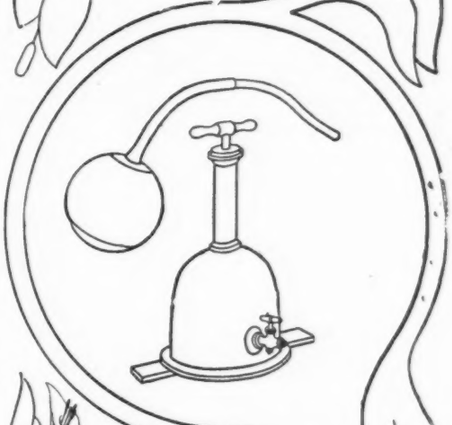
| Day of Week. | Table No. 1. Following the Moon. Date. | Light. | Extinguish. | Table No. 2. New York City. All Night Lighting. Light. | Extinguish. |
|---|---|---|---|---|---|
| | | | | P.M. | A.M. |
| Wed. | 1 | 7.40 PM | 4.30 AM | 6.30 | 4.20 |
| Thu. | 2 | 8.20 | 4.30 | 6.30 | 4.20 |
| Fri. | 3 | 9 10 FQ | 4.30 | 6.15 | 4.30 |
| Sat. | 4 | 10.20 | 4.30 | 6.15 | 4.30 |
| Sun. | 5 | 11.20 | 4 30 | 6.15 | 4.30 |
| Mon. | 6 | 12.40 AM | 4.30 | 6.15 | 4.30 |
| Tue. | 7 | 1.50 | 4.30 | 6.15 | 4.30 |
| Wed. | 8 | 3.00 | 4.30 | 6.15 | 4.30 |
| Thu. | 9 | No L. | No L. | 6.15 | 4.30 |
| Fri. | 10 | No L. FM | No L. | 6.05 | 4.40 |
| Sat. | 11 | No L. | No L. | 6.05 | 4.40 |
| Sun. | 12 | 6.40 PM | 7.40 PM | 6.05 | 4.40 |
| Mon. | 13 | 6.40 | 8.00 | 6.05 | 4.40 |
| Tue. | 14 | 6.40 | 8.30 | 6.05 | 4.40 |
| Wed. | 15 | 6.40 | 9.00 | 6.05 | 4.40 |
| Thu. | 16 | 6.40 | 9.40 | 6.05 | 4.40 |
| Fri. | 17 | 6.40 | 10.20 | 5.55 | 4.50 |
| Sat. | 18 | 6.40 LQ | 11.10 | 5.55 | 4.50 |
| Sun. | 19 | 6.30 | 12.10 AM | 5.55 | 4.50 |
| Mon. | 20 | 6.30 | 1.10 | 5.55 | 4.50 |
| Tue. | 21 | 6.30 | 2.20 | 5.55 | 4.50 |
| Wed. | 22 | 6.30 | 3.20 | 5.55 | 4.50 |
| Thu. | 23 | 6.30 | 4.50 | 5.55 | 4.50 |
| Fri. | 24 | 6.30 | 4.50 | 5.40 | 5.00 |
| Sat. | 25 | 6.30 | 4.50 | 5.40 | 5.00 |
| Sun. | 26 | 6.20 NM | 5.00 | 5.40 | 5.00 |
| Mon. | 27 | 6.20 | 5.00 | 5.40 | 5.00 |
| Tue. | 28 | 6.20 | 5.00 | 5.40 | 5.00 |
| Wed. | 29 | 6.20 | 5.00 | 5.40 | 5.00 |
| Thu. | 30 | 6.20 | 5.00 | 5.40 | 5.00 |

### TOTAL HOURS LIGHTING DURING 1897.

| By Table No. 1. | Hrs.Min. | By Table No. 2. | Hrs.Min. |
|---|---|---|---|
| January | 233.00 | January | 423.20 |
| February | 187.20 | February | 355 25 |
| March | 202.00 | March | 355.35 |
| April | 170.40 | April | 298.50 |
| May | 163.00 | May | 264.50 |
| June | 140.40 | June | 234.25 |
| July | 151 40 | July | 243.45 |
| August | 167.30 | August | 280.25 |
| September | 174.40 | September | 321.15 |
| October | 200.00 | October | 374.30 |
| November | 205.20 | November | 401.40 |
| December | 220.10 | December | 433.45 |
| Total, yr. | 2216.00 | Total, yr. | 3987.45 |







# To Whom It May Concern.

WE have learned that the makers of the "Sunlight" lamp assert that there has been a decision in the English Courts which saves them and their customers from liability as infringers of the Welsbach patents.

We assure the public there is no decision of any Court, in England or elsewhere, that directly or indirectly warrants the statement or inference that the lamp sold by the Sunlight Incandescent Gas Lamp Company of America is not an infringement of the Welsbach Light as made under the American patents, of which the Welsbach Light Company is sole and exclusive owner.

NOTICE is hereby given to all PURCHASERS and USERS of the so-called "Sunlight" lamp that suits will be brought against them for DAMAGES for INFRINGEMENT of the Letters Patent of the Welsbach Light Company, and will be prosecuted vigorously.

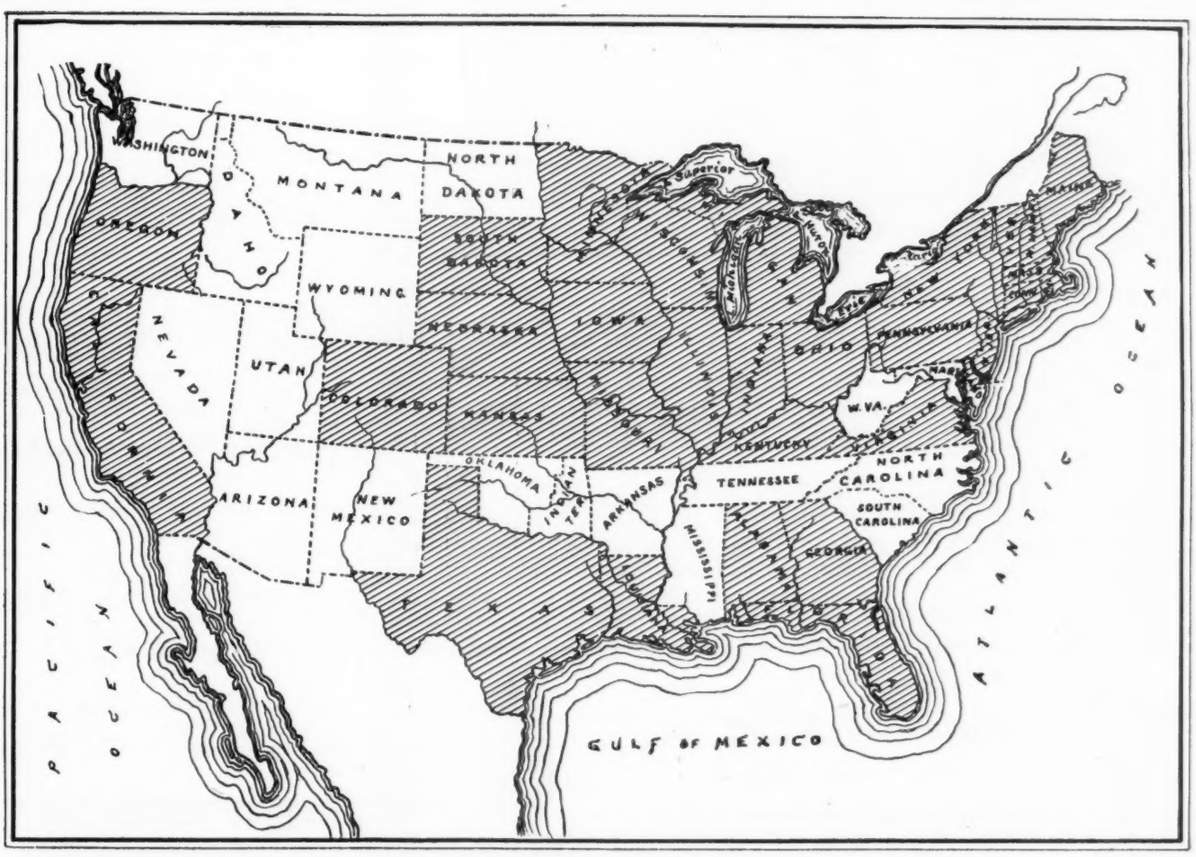
**WELSBACH LIGHT COMPANY.**

# The United Gas Improvement Company,

DREXEL BUILDING, PHILA., PA.

**Originators and Builders of the**

## Standard Double Superheater Lowe Water Gas Apparatus.



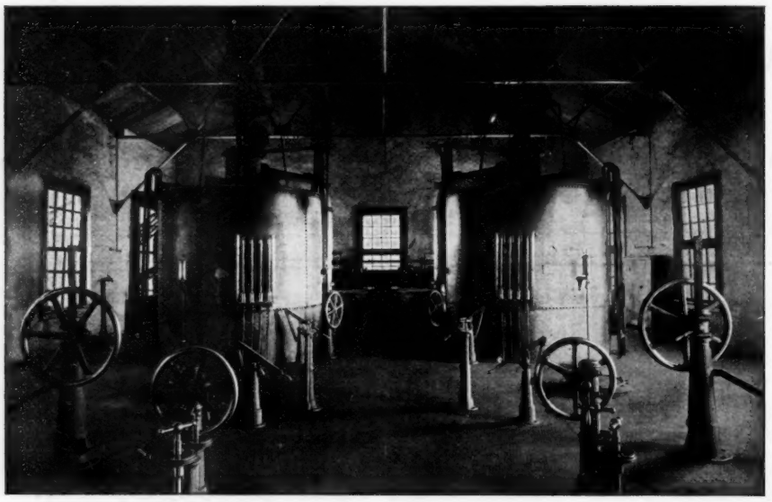

**SHADING INDICATES STATES IN WHICH HAVE BEEN BUILT THE STANDARD DOUBLE SUPERHEATER AND JUNIOR LOWE WATER GAS APPARATUS.**

UPWARDS OF 215 SETS INSTALLED TO JANUARY 1, 1897.
ELEVEN PLANTS NOW IN PROCESS OF CONSTRUCTION.

## Builders, Lessees and Purchasers of Gas Works.

**Pamphlets, Plans and Estimates Furnished.**

# Selected Over All Competitors



by

The Milwaukee Gas Light Company

in February, 1896.

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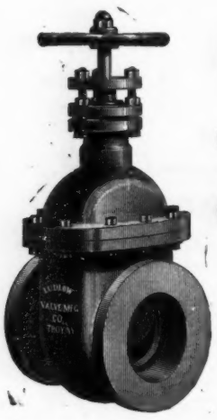

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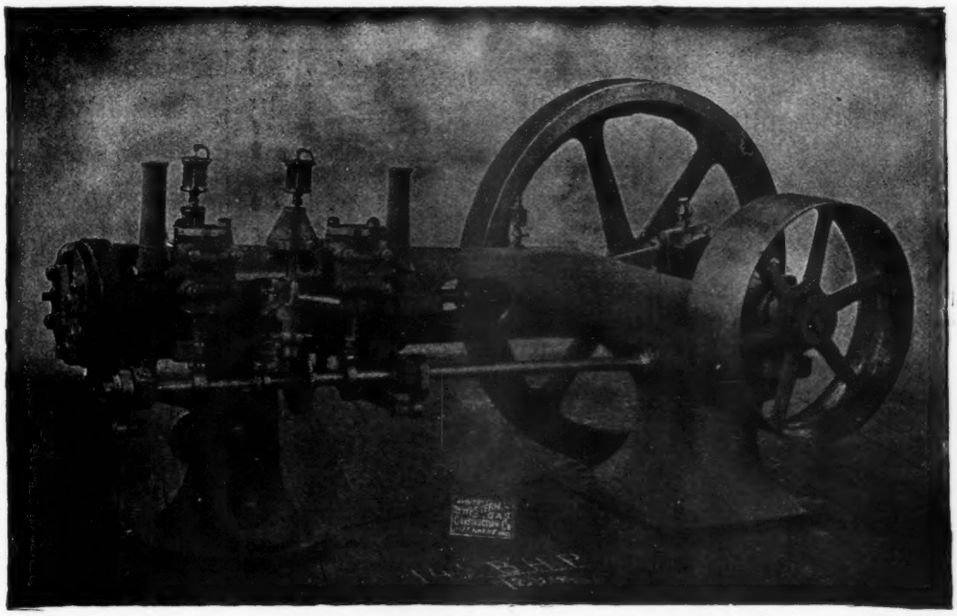

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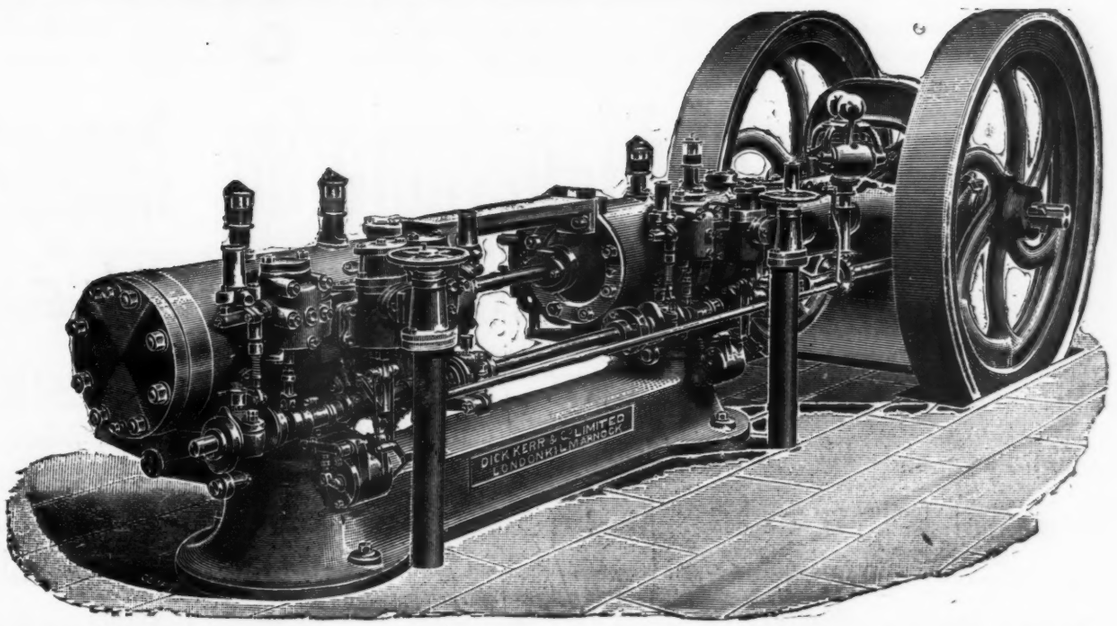


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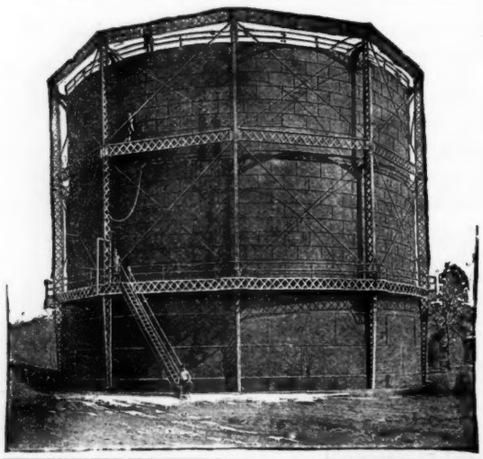

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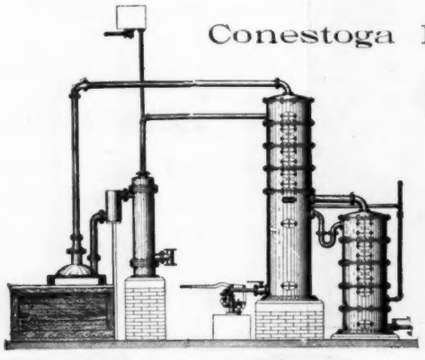

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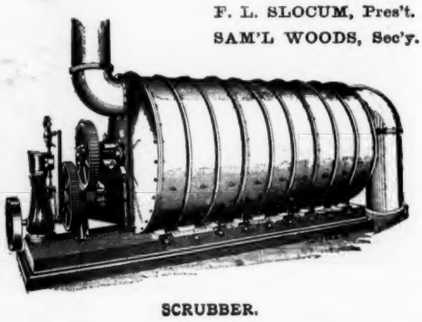

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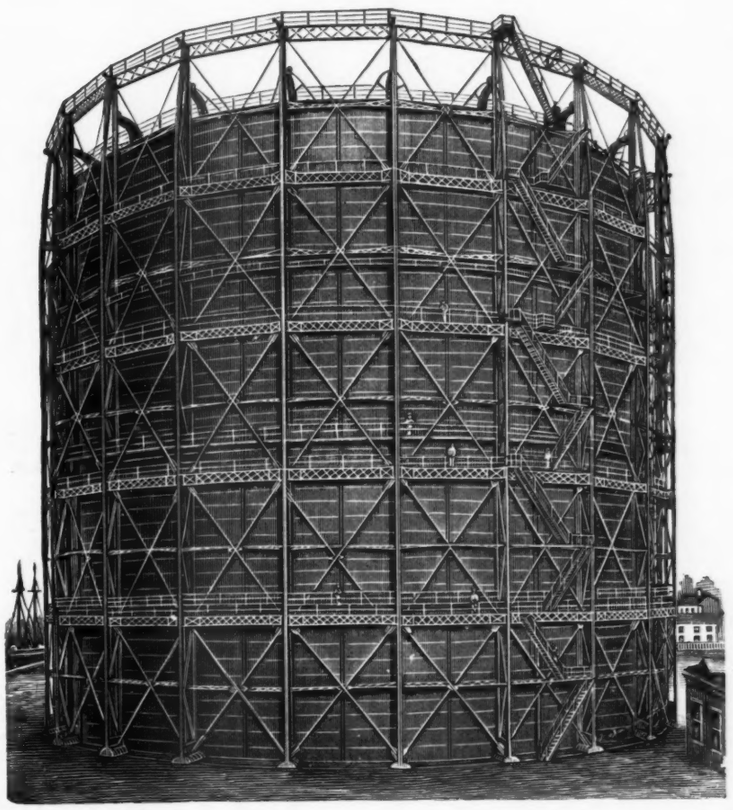

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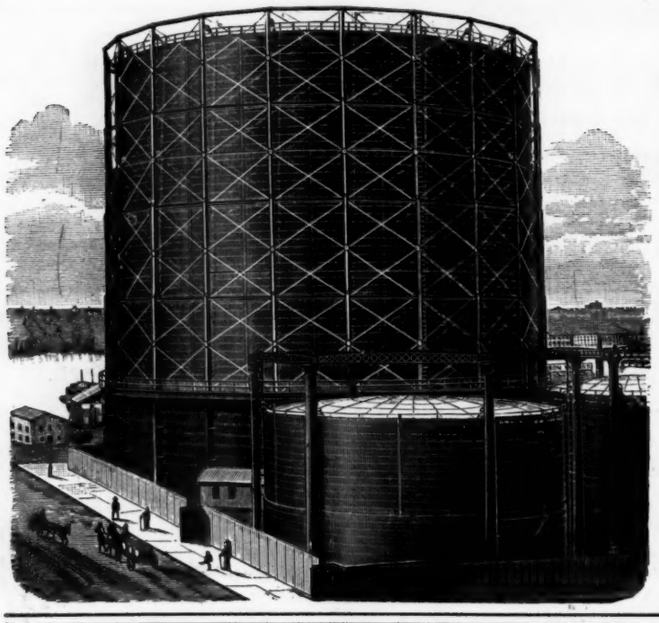

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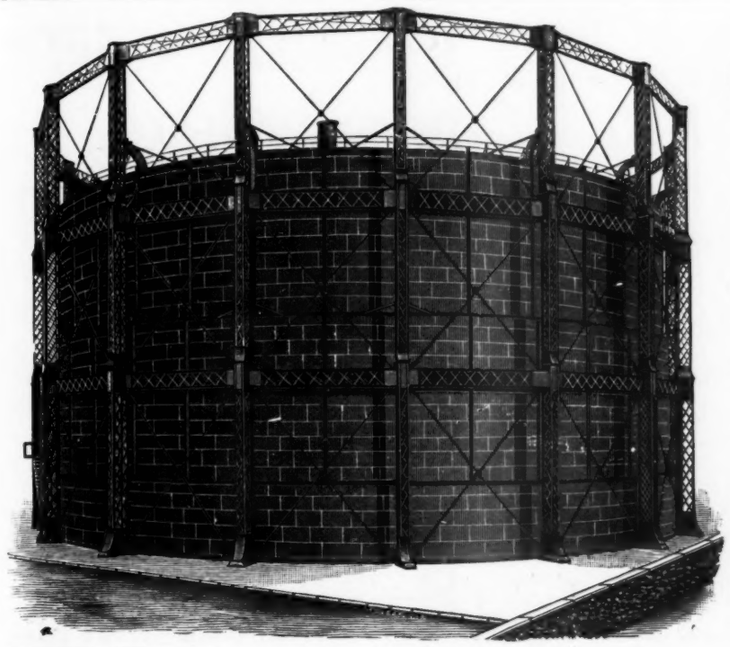

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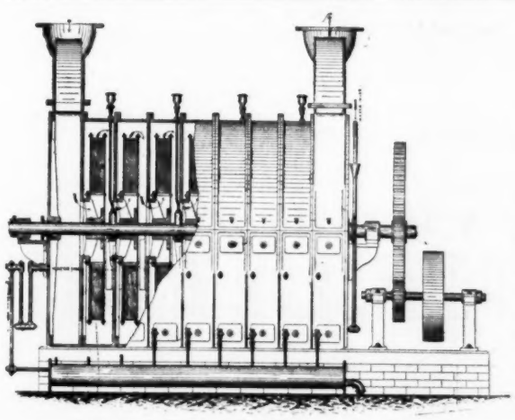

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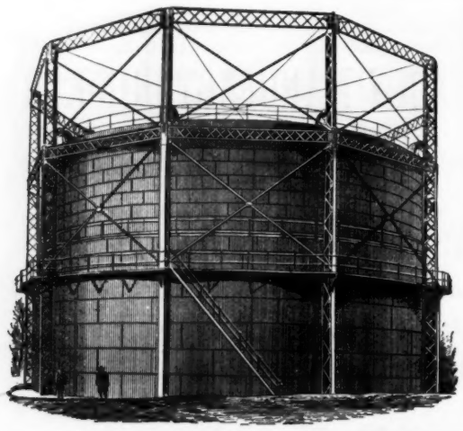

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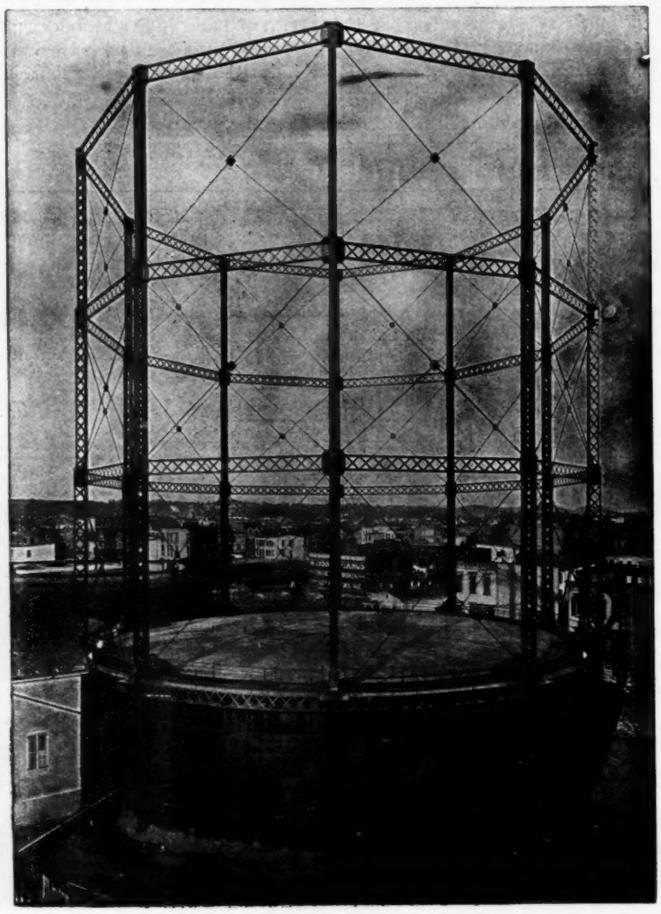

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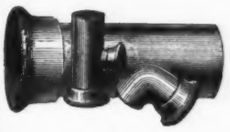

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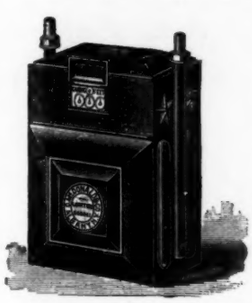

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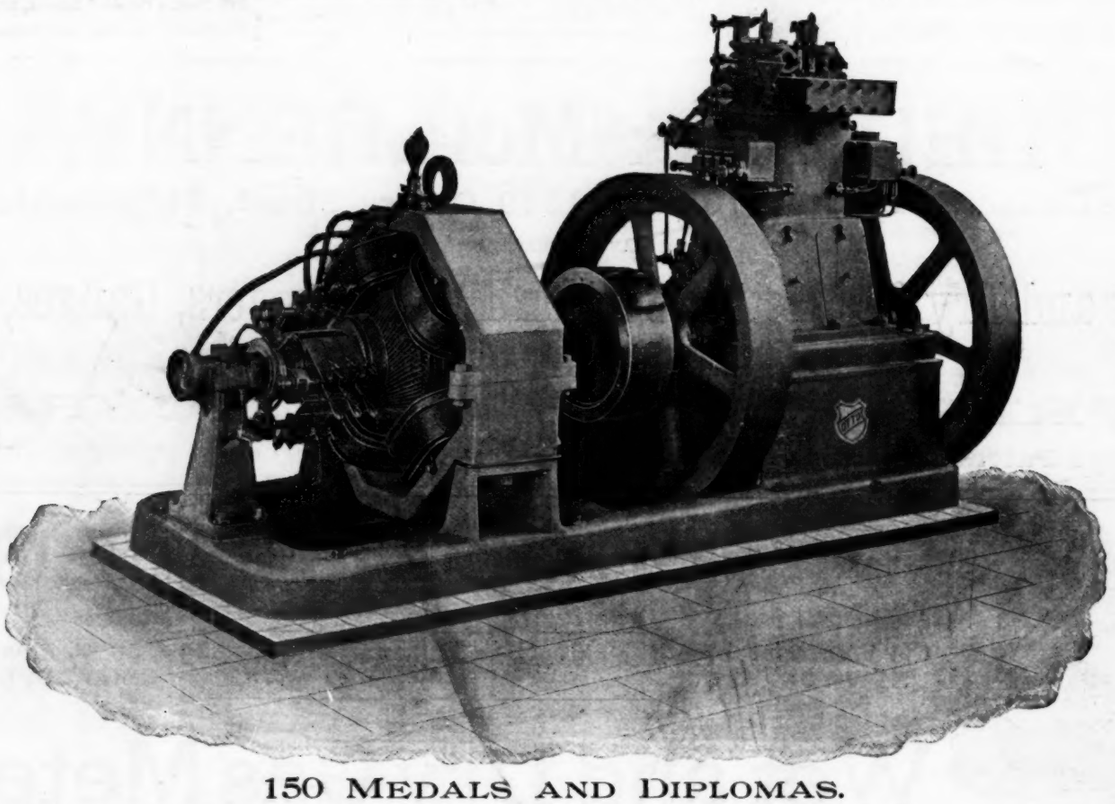

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